QL
461
E574
V.25
No. 8
Biological
& Medical
Serials

STORAGE

PROPERTY
OF
TORONTO BRANCH
ENTOMOLOGICAL SOCIETY
OF ONTARIO
No. .....

CANCELLED

OCTOBER, 1914.

ENTOMOLOGICAL NEWS

Vol. XXV. No. 8

J. Brackenridge Clemens,
Died 1867.

PHILIP P. CALVERT, Ph.D., Editor.
E. T. CRESSON, Jr., Associate Editor.

HENRY SKINNER, M.D., Sc.D., Editor Emeritus.

ADVISORY COMMITTEE:

EZRA T. CRESSON. PHILIP LAURENT. ERICH DAECKE. J. A. G. REHN. H. W. WENZEL.

PHILADELPHIA:
THE ACADEMY OF NATURAL SCIENCES,
LOGAN SQUARE.

Entered at the Philadelphia Post-Office as Second-Class Matter.

ENTOMOLOGICAL NEWS

published monthly, **excepting August and September**, in charge of the Entomological Section of the Academy of Natural Sciences, Philadelphia, and the American Entomological Society.

ANNUAL SUBSCRIPTION, $2.00 IN ADVANCE.

NEW SUBSCRIPTIONS $1.90 IN ADVANCE. SINGLE COPIES 25 CENTS

Advertising Rates: Per inch, full width of page, single insertion, $1.00; a discount of ten per cent. on insertions of five months or over. No advertisement taken for less than $1.00—Cash in advance.

☞All remittances, and communications regarding subscriptions, non-receipt of the NEWS or of reprints, and requests for sample copies, should be addressed to ENTOMOLOGICAL NEWS, Academy of Natural Sciences, Logan Square, Philadelphia, Pa. *All Checks and Money Orders to be made payable to the* ENTOMOLOGICAL NEWS.

☞Address all other communications to the editor, Dr. P. P. Calvert, 4515 Regent Street, Philadelphia, Pa., from September 15th to June 15th, or at the Academy of Natural Sciences from June 15th to September 15th.

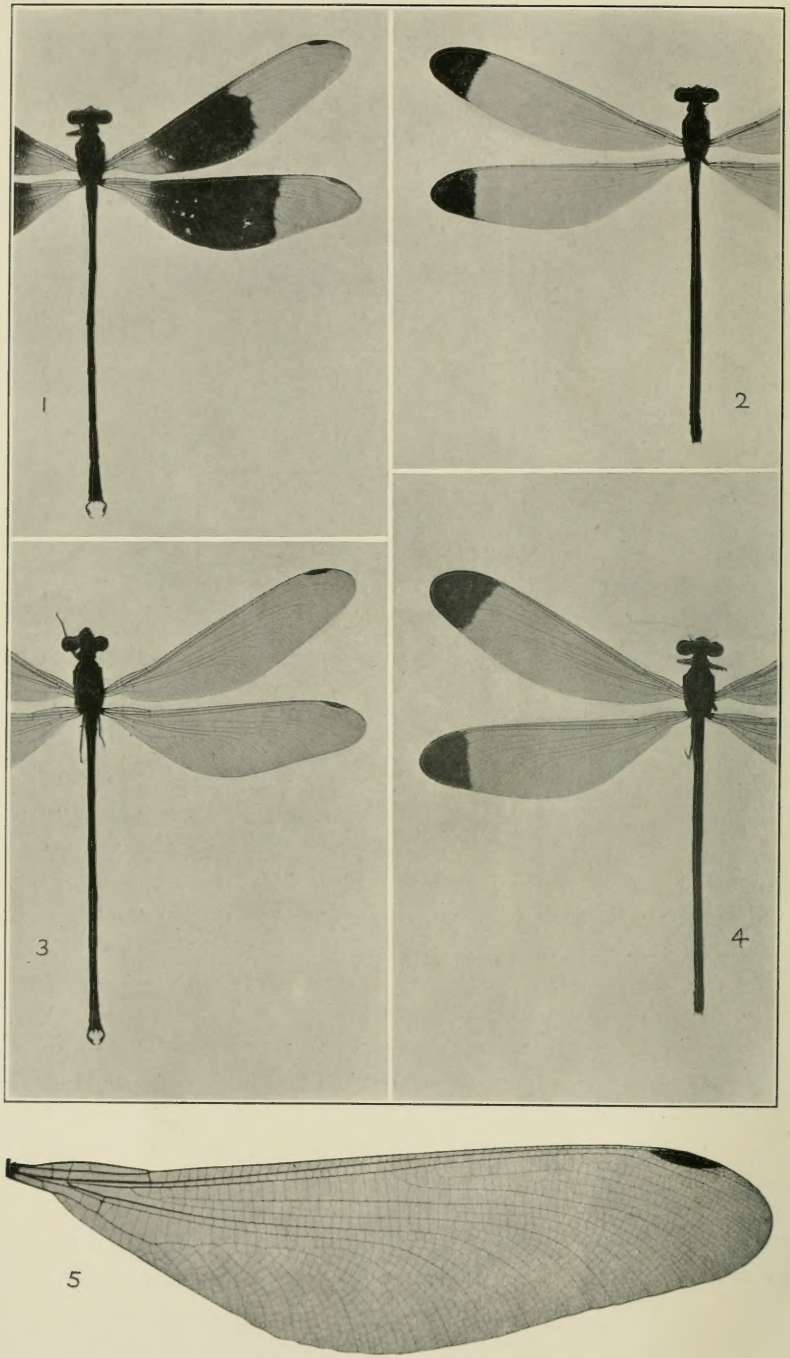
☞PLEASE NOTICE that, beginning with the number for January, 1914, the NEWS will be mailed only to those who have paid their subscriptions.

The Conductors of ENTOMOLOGICAL NEWS solicit and will thankfully receive items of news likely to interest its readers from any source. The author's name will be given in each case, for the information of cataloguers and bibliographers.

TO CONTRIBUTORS.—All contributions will be considered and passed upon at our earliest convenience, and, as far as may be, will be published according to date of reception. ENTOMOLOGICAL NEWS has reached a circulation, both in numbers and circumference, as to make it necessary to put "copy" into the hands of the printer, for each number, four weeks before date of issue. This should be remembered in sending special or important matter for a certain issue. Twenty-five "extras," without change in form and without covers, will be given free, when they are wanted; if more than twenty-five copies are desired, this should be stated on the MS. The receipt of all papers will be acknowledged. Proof will be sent to authors for correction only when specially requested.

☞ The printer of the NEWS will furnish reprints of articles over and above the twenty-five given free at the following rates: Each printed page or fraction thereof, twenty-five copies, 15 cents; each half tone plate, twenty-five copies, 20 cents; each plate of line cuts, twenty-five copies, 15 cents; greater numbers of copies will be at the corresponding multiples of these rates.

1,000 PIN LABELS 25 CENTS! At Your Risk. (Add 10¢ for Registry or Checks)
Limit: 25 Characters; 3 Blank or Printed Lines (12 Characters in Length.) Additional Characters i.c. per 1,000.
In Multiples of 1,000 only; on Heaviest White Ledger Paper---No Border---4-Point Type---About 25 on a Strip---No Trimming---One Cut Makes a Label. SEND ME ORDER WITH COPY, FOR ANY KIND OF ARTISTIC PRINTING LARGE OR SMALL. INDEX CARDS, MAPS, SEX-MARKS, LABELS FOR MINERALS, PLANTS, EGGS Etc. IF QUANTITY IS RIGHT, PRICE IS SURE TO BE.
C. V. BLACKBURN, 77 CENTRAL STREET, STONEHAM, MASSACHUSETTS
Orders totalling less than 5,000 (all alike or different) double price.



1 ♂, 2 ♀, THAUMATONEURA INOPINATA,
3, 5 ♂, 4 ♀, TH. PELLUCIDA.—CALVERT.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XXV. OCTOBER, 1914. No. 8.

CONTENTS:

Calvert—Studies on Costa Rican Odonata—V..... 337
Swainson and Skinner—The Larva of Papilio homerus (Lepid., Rhop.).. 348
Townsend, Essig—Changes of Address 349
Dodd—A new Proctotrypoid Egg-parasite from the West Indies (Hym.) 350
Alexander—The Neotropical Tipulidae in the Hungarian National Museum (Dipt.)—IV..... 351
Franzen—Minnesota Butterflies (Lep.) 363
International Commission on Zoological Nomenclature..... 371
Editorial—Aids to Scientific Work.... 372
Robertson—A new Melissodes (Hym.) 373
Entomological Literature..... 373
Review of Oberthur's Études de Lépidopterologie Comparée..... 379
Doings of Societies—Pacific Coast Entomological Society (Lep., Col., Hym., Dip.)..... 380
Obituary—Carl Fuchs..... 384

Studies on Costa Rican Odonata.

V. The Waterfall-Dwellers: Thaumatoneura imagos and possible male dimorphism.

By PHILIP P. CALVERT, PH.D., University of Pennsylvania, Philadelphia, Pa.

(Plate XIV.)

HISTORY.

In June, 1897, the late Robert McLachlan, of London, described a new and remarkable dragonfly under the name *Thaumatoneura inopinata.* He introduced his description with these words: "At the recent sale of the collections formed by the late Mr. Reginald Cholmondeley, of Condover Hall, Shrewsbury, I obtained the few *Odonata,* solely on account of a large Calopterygine, which was evidently something unknown, but the remarkable nature of which I did not fully realize until after it came into my possession. The former owner of the collection valued insects and other natural productions, solely for their beauty or forms, and cared little for names, and nothing for localities, so I am unable to say whence this specimen came; but as the pin (or rather skewer!) was similar to those used for some other insects in the same collection which were Chinese or Japanese in origin, I hazard a conjecture that it may belong to the same region." In August,

1900, however, he was able to state that this insect belonged to the New World, as M. Martin possessed a specimen from Chiriqui, in Panama.

About 1903 Mr. C. F. Underwood collected at Carrillo, Costa Rica, six males of *Thaumatoneura* and sent them to London, where they were acquired by Dr. F. D. Godman, and sent to me for study. Four of the six were the *inopinata* of McLachlan with the middle of each wing crossed by a broad, dark brown band. The other two had the wings uncolored, wherefore they received the name *Thaumatoneura pellucida* (Calvert, 1904).

On June 23, 1909, the first day of our first stay at Juan Viñas, Costa Rica, our lepidopterological friends, Messrs. William Schaus and J. Barnes, gave us some Odonata which they had taken there for us, including some males of both *inopinata* and *pellucida* and two female *Thaumatoneurae,* so different from the males that it was impossible to determine to which of the two species they should be referred; they had the *tips* of all the wings dark brown. Thereafter, *Thaumatoneura* became for us one of the principal attractions of Juan Viñas, that delightful spot which, as readers of the NEWS are already aware, furnished us with the remarkable larvae of *Cora,* of *Mecistogaster modestus,* and of other species still to be described.

HABITATS AND HABITS.

Of all the localities in Costa Rica which we visited, Juan Viñas was the only one where we ever saw *Thaumatoneura.* We were not at Carrillo, but in many respects the Odonate fauna of this place, judging from Mr. Underwood's collection recorded in the *Biologia Centrali-Americana,* is very similar to that of Juan Viñas. The former is on the northern, the latter on the southeastern slope of the volcano Irazú and their respective altitudes are 300 and 1040 metres (980 and 3400 feet). *Thaumatoneura* must surely live in still other places in Costa Rica.

In our experience *Thaumatoneura,* as adult or as larva, was never more than a few yards distant from a waterfall and was most abundant within its spray. The sides of the canyon

of the Rio Reventazon at Juan Viñas descend steeply from 1200 to 760 metres (4000 to 2500 feet) at the river, and down the canyon side tumble many small streams and rivulets, often in cascades and in falls of different heights. Where there is slant enough the wet rocks nearby are draped with mosses, maiden hair ferns, begonias, dwarf Selaginellas, Tradescantias, a *Streptocarpus*-like plant, etc., or in quieter more sheltered places are Melastomes (*Miconia*), *Commelina,* etc. Only at three such falls did we ever observe *Thaumatoneura,* two of them at altitudes of about 3300 feet, the third at about 2500 feet. They were most abundant on the whole at one of the former two falls, one whose perpendicular height was the greatest of the three, perhaps 200-300 feet. We were puzzled why these insects should not be found also at other streams under generally similar conditions. An explanation of their absence from one of these streams, the little Rio Naranjo, is suggested in our diary: "At the Naranjo I saw a number of lizards from two inches to a foot in length and these possibly keep down the number of insects. At our two waterfalls [*i. e.* where we frequently found *Thaumatoneura*] we have seen no lizards."

We observed the imagos of *Thaumatoneura* in June (23-28), July 21 to August 3, September 28 and 29, when there was an evident decrease in their numbers; October 1 and December 2, 1909. In February (14-18), and March (21), 1910, none could be found, but they were again visible in April. In June, 1909, the males of *pellucida* appeared to be less numerous than those of *inopinata.* All the males of *Thaumatoneura* observed in July were pruinose, but two teneral females were taken on August 1.

"Males, at least, often remain on the same spot for a long time without moving—I should say for half an hour or longer. Females seem less persistent, but one I timed was ten minutes on the same bit of twig. Except in pairing males, the wings of both sexes, when at rest, are held in the vertical position, folded together but every now and then an individual will open and then close its wings once or several times in succession." "Standing at the bottom of the waterfall and looking up

through the spray and over the vegetation which carpets the almost perpendicular rocks, I could see the Thaumatoneuras—two species (*inopinata* and *pellucida*)—fluttering through the spray, chasing each other or alighting upon the rocks and plants. So heedless of the spray are they that it gathers in little drops on the wings or hangs suspended from the hind end of the body." (June 24, 1909).

"At the farther waterfall was one male each of *T. inopinata* and *T. pellucida*. I stayed here fully an hour during which there were periods of bright sunshine, but no more Thaumatoneuras came, and the two mentioned remained for long periods almost motionless on twigs until I caught them." (December 2, 1909).

Owing to the habit of *Thaumatoneura* of spending most of the time over vertical wet rocks, the capture of them was often only possible by climbing up on the rocks themselves, or by hanging with one hand to some long, dangling, nearby root or vine and with the other sweeping the net.

Pairing of *T. inopinata* was observed twice on June 24 and once on June 27; of *T. pellucida* once on July 30 and again on October 1. Notes made at the time on the behavior of *inopinata* are to the following effect: The male seeks and flies after the female and seizes her by her prothorax, his superior appendages being deeply inserted behind her prothorax and between it and the mesothorax, while his inferior appendages are applied against the dorsal surface of her prothorax (this from a pair which I caught and held in my fingers). After seizing the female, the male probably applies the ventral surface of his ninth abdominal segment to the ventral surface of his second abdominal segment to charge the vesicle of the latter with sperm; of this I am not entirely sure as I think I saw it but once and the operation itself occupies very little time. Male and female then assume the usual position of the Odonata in pairing. Different pairs of *inopinata* require different lengths of time to effect the attachment of the female to the male, one pair having made four or five attempts before this was accomplished, another pair effecting it at once. In one case on June 24, 1909, where I did not see the actual begin-

ning of mating, it was 3 P. M.; in the other case it began at 3.45 P. M. In both cases the male held his wings horizontal and expanded, the female had hers vertical and folded together. At the end of ten minutes the male released his hold of the female and at the same instant folded his wings together into the vertical position. The female, losing her attachment by her abdomen to the male, assumed in both cases a position about half an inch below the male resting on the same twig or rock on which he was. So the two remained for about four minutes. In the first case male and female then flew away at about the same instant, but not together, she to begin egg-laying. In the second case the female flew six inches or so away and began egg-laying while the male remained for at least ten minutes on the same spot (projecting rock) on which the pairing had occurred. In the case of June 27th, after pairing the male flew away leaving the female resting on the leaf which both had occupied.

No *pellucida* were observed pairing in June and the males of this species were less numerous than those of *inopinata*. On July 30, 1909, after some hours' watching, I saw a male *pellucida* and a female fly to a dead branch on the bank or side of the railroad cutting just west of the farther waterfall and about twenty feet above the tracks. There was no doubt that they were pairing, so it was highly desirable to capture them both. The steep bank was composed of reddish soil, loose stones and soft rock, and was wet from the rains. I climbed up as far as the steepness permitted, but the distance was still too great for the length of my net stick. After two attempts to lengthen it with branches, which chanced to be lying there, but which broke under the weight of the net, the umbrella was utilized for this purpose. Again I climbed the bank, but the soft earth gave way and collector, net and umbrella slid swiftly and separately to the railroad tracks. A second attempt had the same result. A third, made more cautiously, was so successful that the net was thrown over the accommodating pair which had lingered for at least ten minutes on the same branch and by gently dragging the net down over the bank I at last got the insects safe into my hands. Then it was that I realized for the

first time that this female was so like the females which we had seen and taken pairing with *inopinata* males that a minute comparison would be necessary to determine whether there was any difference between them or not. We saw no other pairs of *pellucida* until October 1, 1909, when one was seen and obtained at the same waterfall.

What we presumed to be egg-laying was watched in three or four instances on June 24. The female made the usual abdominal movements seen in the Zygoptera generally, that is those adapted for inserting the eggs into plant substances. Some of these movements were, however, over hard rock and it seems unlikely that any eggs were placed on it. At other times the movements were made against moss and roots. At times the female had her abdomen buried to half its length in the mass of wet moss. Pieces of roots and of moss in which the oviposition had apparently been made were carried to our room at Cartago and kept in water for months but we never obtained any larvae from them. The ovipositing female is not accompanied or followed by the male. Indeed once, on June 24, a female flew close to a resting male without attracting any response from him.

The Female.

We have three females of *Thaumatoneura* taken while pairing; one is that taken with *inopinata* male on June 27, 1909, the other two taken with *pellucida* males on July 30 and October 1 respectively. Nine other females were taken singly. All twelve females are compared in the accompanying table with respect to all the differences which I have been able to detect between the female of June 27 (No. 9) on the one hand, and those of July 30 (No. 11) and of October 1 (No. 12) on the other. It will be seen that these differences are very slight and that the positions of Nos. 9, 11 and 12 in the whole series are such as to render it unlikely that females of *inopinata* can be distinguished from those of *pellucida* by any of these features.

Male Dimorphism.

This apparent lack of external characters separating the females pairing with *pellucida* males from that pairing with *in-*

COMPARISON OF THAUMATONEURA FEMALES ARRANGED IN ORDER ACCORDING TO THE RATIO $\frac{b}{a}$.

	1 June 28	2 July 21	3 Aug. 1	4 Apr. 30	5 June 23	6 June 26	7 Aug. 1	8 May	9 June 27	10 June 28	11 July 30	12 Oct. 1
Length of left hind wing in mm. (a)	45	48.5	49.5	49	49	49	49	50.5	46	47	49.5	48
Width of left hind wing at origin of M_2, measured at right angles to costa, in mm. (b)	10.5	11.5	12	12	12	12	12	12.5	11.5	12	13	13
Value of ratio $\frac{b}{a}$	.233	.237	.242	.245	.245	.245	.245	.247	.25	.255	.263	.27
Width of left hind wing at proximal edge of brown spot at tip, measured parallel to width b, in mm. (c)	10.	10.5	10.5	10.	10.5	11.	10.5	11.5	9.5	10.5	11.	11.
Distance from tip of left hind wing to proximal edge of brown spot measured at right angles to b and c, in mm.	9.	10.	8.5	8	9	10	9.5	10.5	8.	9.5	8.5	9
Point of beginning of two rows of cells between M_2 and Rs with reference to the proximal edge of the brown spot at tip (front wings only)	5 cells distal	distal	3 (R) 5 (L) cells proximal	1 (R) 2 (L) cells proximal	at (R) distal (L)	at	at	at (R) 1 cell proximal (L)	at	at	4 cells proximal	3 (R) 5 (L) cells proximal
Formulae showing how the increase in density of reticulation between M_4 and Cu_1 begins (front wings only)	2,3,3,3, 3,3,3,3, 4....(R) 2,2,3,3, 3,3,3,3, 4....(L)	2,3,3, 3,3,3, 4....(R) 2,3,3, 3,3, 4....(L)	2,3,3,3, 3,3,3, 4....(R) 2,2,2,2, 3,3,3,3, 4....(L)	2,3,3,3, 3,3, 4....(R) 2,3,3,3, 3,3,3,3, 4....(L)	2,3,3,3,3, 3,3,3,4, (R, L)	2, 2, 3, 3, 3, 4....(R) 2,2,3,3,3, 3,3,3,3, 4....(L)	2,3,3,3, 4....(R) 2,2,3,3, 3,3, 4....(L)	2,3,3,3,3, 3,3,3,3 4....(R) 2,2,3,3,3, 3,3,3,3, 4....(L)	3,3,3, 3,3, 4....(R) 3,3,3,3, 3,3,3,3, 4....(L)	2,3,3,3,3, 3,3,3,4, (R, L)	2,3,3, 3,3, 4....(R) 2,2,3, 3,3,3, 4....(L)	2,2,3,3, 4....(R) 2,2,2, 3,3, 4....(L)
Length of the abdomen (including appendages) in mm.	50	50	51.5	54	55	54	52	53	51 *	53	54 †	53 †

* Taken pairing with *inopinata* ♂. † Taken pairing with *pellucida* males. The year of No. 4 is 1910, of all others 1909.

opinata male suggests the query as to whether we are dealing with two or one species here. A number of species of Odonata are known (not to mention other groups) in which there is one form of male and two forms of females within the same species. Such are members of the genera *Ischnura, Anomalagrion, Ceratura, Agriocnemis* and *Neurothemis, Erythrodiplax umbrata* and *funerea*. While some of these so-called dimorphic females are explicable as due to differences in age, others can not be interpreted in that way. Can *Thaumatoneura* present an inverse case in which there are two forms of males and but one form of female in the same species? This leads us to consider the differences between the *pellucida* and *inopinata* males.

When I originally described *pellucida* male, I could find only two differences between it and *inopinata* male. One of these was the absence of any coloring on the wing, the other the presence of "a transverse pale citron band on nasus and on frons connecting the yellow genal spots," this band being absent in *inopinata* male. The pale citron of dried specimens, I now know, is pale blue in life. This diversity in the coloring of frons and nasus holds true for the majority of the present examples, but of the fourteen males of *inopinata* two have the pale band very well marked and three others have indications of some pale color on these parts. All fourteen *pellucida* males have the pale band. The *inopinata* males are slightly larger, average length of the abdomen 58.7, range 55-61 mm.; hind wing, average 47.6, range 45-49 mm. (14 specimens). *Pellucida*: Abdomen, average 57.25, range 52-61; hind wing, average 46.85, range 44.5-49.5 mm. (14 specimens). I have not been successful in finding any other differences in the imagos. There is no reason to think that the two forms represent age differences because no transitional individuals (so far as the presence or absence of the coloring of the wings is concerned) have been found. We have seen both forms emerge from the larval exuviae at metamorphosis, and both forms become equally pruinose on the body although so markedly different in wing coloring.

The seasonal distribution of our males is as follows: *In-*

opinata, June 23, 6 males; June 24, 2 males; June 26, 1 male; June 27, 1 male; July 21, 1 male; July 27, 1 male; December 2, 1 male; May 2, 1 male. *Pellucida*: June 23, 1 male; June 24, 2 males; June 26, 1 male; June 27, 1 male; July 22, 1 male; July 27, 1 male; July 30, 1 male; August 3, 1 male; September 28, 2 males; October 1, 1 male; December 2, 1 male; May 1, 1 male. This list gives the actualities, not the possibilities, of capture; on many occasions the insects were not molested as we wished to observe their habits and behavior. This list does show that both forms occur at the same times and, we may add, at the same waterfalls.

Among our exuviae of *Thaumatoneura* we have one from which we saw *inopinata* male emerge, another from which *pellucida* male emerged. A minute comparison of these two exuviae has failed to furnish any differences other than those due to injuries sustained by the larvae previous to transformation.

A definitive answer to the question raised on page 344 as to the relationships between the two male forms of *Thaumatoneura* to each other and to the apparently single form of female, can only be obtained from breeding experiments. As far as present evidence goes, I am inclined toward the dimorphic male hypothesis. If it prove to be true, *Thaumatoneura* would furnish a case more or less parallel to those described by Westwood (1839) for certain Staphylinidae, Leuthner (1885) for Lucanidae, and Skinner (1913) for *Lycaena pseudargiolus.*

Additional Descriptive Notes.

Some additional notes on our Juan Viñas material of *Thaumatoneura* are added.

Description of the Colors of T. pellucida male, taken Dec. 2, 1909. Description made immediately after death. Eyes dark brown, almost black. Each gena with a round yellow spot below the base of the antenna; frons between the right and left yellow spots pale blue as also is the nasus, but the fronto-nasal suture has a black line and black encroaches on each side of the nasus from below. Thoracic sutures and mid-dorsal carina lined with orange-yellow. A short occipital line, four small spots on the front prothoracic lobe and a pair of mid-dorsal spots on the middle prothoracic lobe are also orange-yellow.

The rest of the body is black, covered with pruinosity on labium, under and lateral surfaces of thorax, most of abdominal segment 1, a

large part of the dorsum of 2, a transverse basal ring on 3-7, sides of 8, much of 9 and 10, especially on the dorsum.

Legs yellowish, articulations and tarsi blackish.

The colors immediately after death of T. inopinata male, also taken December 2, 1909, agreed with those noted above for *pellucida,* including the pale colors of frons and nasus, but there was very little pruinosity except on the ventral surface of the thorax and on the posterior abdominal segments. The dark band on the wings varies somewhat in width; its proximal edge is at the nodus, its distal edge at the costa is from 16 to 20 mm. distad on the front wings, from 21 to 25 mm. distad on the hind pair. The male of May 1, however, has the proximal edge of this band 6 mm. beyond the nodus and the distal edge at 21 and 26 mm. from the nodus on front and hind wings respectively; the costal and radial spaces between nodus and the proximal edge of the band are more or less brown.

The colors of the body of Thaumatoneura females (dry, I have no notes on living colors) are as in *inopinata* males. In none of them is a distinct pale band on frons and nasus present, such as can be seen plainly on the dried *pellucida* males; Nos. 2, 5, 6, 8, 10, 11 and 12, of the table on page 343, show traces of pale color on these parts. The markings at the tips of the wings are shown in Pl. XIV, Figs. 2, 4, and the dimensions of this brown area are given in the table just quoted. Dorsum of abdominal segment 10 with a median longitudinal carina; hind margin a little excised; appendages subequal to 10 in length, straight or nearly so, a little compressed, tapering to an acute apex, black. Ovipositor proper (gonapophyses of 8 + median gonapophyses of 9) reaching caudad not as far as the level of the hind end of 10, each lateral half having ten to twelve obliquely transverse ridges on its external (ectal) surface before the apex. Genital valves (lateral gonapophyses of 9) reaching caudad beyond the level of the hind end of 10, ventral edge of each in its caudal half hairy and denticulated, hind end emarginated, valvular process attached at the deepest point of the concavity and directed caudad and ventrad.

The variation in the number of antenodals is as follows, the numbers giving percentages of wings:

	14 *inopinata* ♂	14 *pellucida* ♂	12 *Th.* ♀
Front wings			
with 3	67.87	71.4	70.83
with 3 and rudimentary 4th	3.57	3.57	
with 4	28.57	25.0	25.0
with 2			4.16
Hind wings			
with 3	75.	71.4	62.5
with 3 and rudimentary 4th	3.57	7.1	
with 4	21.42	17.85	37.5
with 5		3.57	

In all cases the "rudimentary 4th" antenodal is a small stump projecting from the anterior side of the subcosta toward, but not reaching, the costa.

The relationships of *Thaumatoneura* have been discussed by McLachlan (1897), Needham (1903), Foerster (1909), and the writer (1902, 1913).

The larva of *Thaumatoneura* will be described in the next number of these studies.

BIBLIOGRAPHY.

Calvert, P. P. 1901. Biologia Centrali-Americana, Neuroptera, p. 58, Tab. III, Figs. 16, 21, 27. (Brief description of *T. inopinata* ♂; habitus, venation and appendages figured.) Cf. *l. c.*, p. 354 (1907).

Calvert, P. P. 1902. On the Systematic Position of *Thaumatoneura inopinata*, McLachlan (Order Odonata), with some remarks on the Classification of the Suborder Zygoptera. *Ent. Mo. Mag.* (2) XIII, pp. 29-32. (Refers *Th.* to the Agrionine legion Podagrion of de Selys.)

Calvert, P. P. 1904. *Thaumatoneura* again. *Ent. News*, XV, p. 216. (Original description of *pellucida* ♂; additional data on *inopinata* ♂.)

Calvert, P. P. 1910. Zoological Researches in Costa Rica. *Old Penn Weekly Review of the University of Pennsylvania*, Philadelphia, IX, pp. 165-170. (General account of the habits and habitat of *Th.*, p. 167.)

Calvert, P. P. 1913. The Fossil Odonate *Phenacolestes*, with a discussion of the Venation of the legion Podagrion Selys. *Proc. Acad. Nat. Sci. Phila.*, 1913, pp. 225-272, Pl. XIV. (Comparison of generic characters of *Th.*, p. 233; relationships of *Th.*, pp. 233-235; defense of its reference to legion Podagrion against views of Foerster and of Needham.)

Foerster, F. 1909. Beiträge zu den Gattungen und Arten der Libellen. *Jahrb. Nassau. Ver. Naturk.* Wiesbaden, LXII, pp. 213-235. (Refers *Th.* to the Calopteryginae, p. 214.)

Leuthner, F. 1885. A Monograph of the Odontolabini, a subdivision of the Coleopterous family Lucanidae. *Trans. Zool. Soc. London*, XI, pp. 385-491, Pls. LXXXIV-XCVII. (Dimorphic males in the same species, pp. 389, 395-406.

McLachlan, R. 1897. *Thaumatoneura inopinata*, a new genus and species of Calopteryginae. *Ent. Mo. Mag.*, London, XXXIII, pp. 130-131. (Original description; *cf.* also *l. c.* (2), XI, p. 189, 1900.)

Needham, J. G. 1903. A Genealogic Study of Dragonfly Wing Venation. *Proc. U. S. Nat. Mus.*, XXVI, pp. 703-764, 24 Pls. (Refers

Th. to the Anormostigmatini, or legion Pseudostigma Selys, of the Agrioninae, pp. 748-749, footnote.)

SKINNER, H. 1913. Antigeny in Nearctic Butterflies (Lepid.). *Ent. News,* XXIV, pp. 23-27. (Dimorphic males of *Lycaena pseudargiolus,* pp. 25, 26.)

WESTWOOD, J. O. 1839. An Introduction to the Modern Classification of Insects, Vol. I. (Dimorphic males in the same species of Staphylinidae, p. 172. See comment in Darwin's *Descent of Man,* Chap. X; Appleton's edition of 1896, New York, p. 299.)

EXPLANATION OF PLATE XIV.

Figs. 1 and 2. Male *Thaumatoneura inopinata* and female taken pairing at Juan Viñas, Costa Rica, June 27, 1909. x ¾.

Figs. 3 and 4. Male *Th. pellucida* and female taken pairing at the same place, October 1, 1909. x ¾.

Fig. 5. Right hind wing of *Th. pellucida* ♂, shown in Fig. 3. x 2 1-6. All five figures from photographs by Mr. H. A. Walters.

The Larva of Papilio homerus (Lepid., Rhop.).

By E. M. SWAINSON and HENRY SKINNER, M.D.

(Plate XVI, fig. 2.)

Papilio homerus, the largest American butterfly, one of the largest of the *Papilio* family, is said to be found only in the Island of Jamaica, West Indies.

The larva is very curious and differs from most of the caterpillars of the Papilionids in not having the two fleshy retractile tentacles upon the back of segment next the head. The color is green and brown; across the "neck" is a band of white, in shape something like a half moon, and on this band are spots of blue; in front of this is a band of brown with a spot at each end, in the centre of which is a line of pale blue. These spots look very like eyes when the larva is at rest. The caterpillar is about two and a half inches long. It generally rests on top of the leaf and is about the same color of green; this may account for its not being easily found as the tree is a lofty one. Five or six caterpillars will lie all together near the leaf stalk, and the eye-like spots on their heads give them the appearance of being on the watch for something.

One of us has published some notes on the occurrence of this species at Bath, Jamaica, in Volume I of the Journal of the

Institute of Jamaica. First noticed it about in October, 1890; very seldom see more than one at a time. October 14th caught a large specimen, 6½ inches across. November 6th a friend captured a female specimen; she deposited 12 eggs of a light green color. 1891 first saw one in April; did not see another until July, and on the 17th caught a good specimen, 6 inches across; got this one up the Fountain Road. August 21st captured another in my garden. Since then have not seen one down here, but up Beacon Hill, two miles above Bath, on September 27th saw a poor specimen, but could not catch it. October 13th captured a good specimen, 6¾ inches across the wings; it was the largest *homerus* I have ever seen.

The larva is described by E. Stuart Panton in the same Journal, I, 375, 1893, from a larva sent by Mrs. Swainson. On p. 381 it is said that the food plant was doubtfully determined as the mahoe, *Hibiscus elatus*, var. *abutiloides*.

The larva was also described by C. B. Taylor in ENT. NEWS, V, 101, 1894. He says the food plant is a tree growing to a large size and of great height, bearing subovate leaves with long stalks, deep glossy green. The local name, "Water Wood"; botanical name unknown. A note by the then editor of the NEWS says the food plant is probably *Chimarrhis cymosa* Jacq.

Colonel Wirt Robinson* found what is probably the true home of this *Papilio*, at the summit of Cuna Cuna pass in the Blue Mountains. On July 13th he took fifteen specimens and between July 10th and 20th caught 44. His account of the journey after *homerus* is very interesting.

Our half-tone illustration is from a colored drawing of the larva made by Lady Blake.

Changes of Address.

Please insert in next issue of the NEWS my change of address from Lima, Peru, to *U. S. National Museum, Washington, D. C.*, which will be in force after July 1st.—C. H. T. TOWNSEND.

I beg to announce my change of address from The California State Commission of Horticulture, Sacramento, California, to The Department of Entomology, University of California, Berkeley, California.—E. O. ESSIG.

*Ent. News XIV, 17, 1903.

A New Proctotrypoid Egg-parasite from the West Indies (Hym.).

By Alan P. Dodd, Nelson, via Cairns, Queensland.

Family SCELIONIDAE, Sub-family Telenominae.

Genus **Phanurus** Thomson.

Phanurus flavus sp. nov.

♀. Length, 0.80 mm. Golden yellow, the eyes and ocelli black.

Head transverse quadrate, scarcely as wide as the thorax. Thorax one-half longer than wide; mesonotum finely polygonally sculptured, without furrows. Abdomen as long as the head and thorax united; much narrower than the thorax, pointed ovate, twice as long as wide, second segment occupying almost the entire length; first and base of second segment striate.

Antennae 11-jointed; scape slender, equal to next four joints combined; pedicel slender, twice as long as wide; first funicle joint much narrower than the pedicel, scarcely longer than wide; second and third subequal, a little longer than the first; fourth very small; club 5-jointed, joints 1—4 quadrate, first joint small.

Forewings extending well beyond tip of abdomen, moderately narrow, hyaline, longest marginal cilia equal to one-half greatest wing width; discal cilia fine, moderately dense, arranged in about 20 rows; submarginal vein attaining the costa at about two-fifths wing length; marginal vein one-half as long as the stigmal, which is moderately long, rather oblique; postmarginal vein twice as long as the stigmal.

♂. Antennae 12-jointed, filiform, funicle joints 1-3 slender, subequal, twice as long as wide; 4-9 subequal, scarcely longer than wide; last joint as long as the pedicel.

(From several specimens, two-thirds inch objective, 1 inch optic, Bausch and Lomb).

Described from several specimens of each sex, on two slides, received from Dr. L. O. Howard, and labeled "360-1912. Bred from eggs of *Ormenis* sp. collected 19th Apr., '12. Rio Pedras, P. R. Thos. H. Jones." The host is a *Fulgorid*, and I know of no other *Telenomid* reared from leafhopper eggs.

Habitat.—West Indies (Rio Pedras, Porto Rico).

Types.—United States National Museum, No. 16364, 3 males, 2 females on a slide.

The Neotropical Tipulidae in the Hungarian National Museum (Diptera).—IV.

By Chas. P. Alexander, Ithaca, New York.

(Plate XV.)

Sub-family TIPULINAE, Tribe Tipulini.

Genus **Macromastix** Osten Sacken.

Macromastix pygmaea sp. n. (Pl. XV, fig. 1).

Size small (wing of ♂ about 10.5 mm.); wings with *R2* obliterated; halteres very long and slender.

Male.—Length 8 mm.; wing, 10.3 mm.; antennae about 9.5-10 mm.

Palpi dark brown; frontal prolongation of the head brown, antennae a little longer than the body, the flagellar segments being greatly elongated, antennae densely clothed with rather short delicate hairs; fore part of the vertex produced into a prominent conical tubercle; front and vertex gray, occiput brownish.

Mesonotal praescutum light brown somewhat darker in front and on the sides, but without apparent stripes; scutum with the lobes brown; scutellum and postnotum light brownish yellow. Pleurae, mesopleurae darker brown than the yellowish metapleurae. Halteres very long and slender, yellowish at base, the remainder brown.

Legs, coxae and trochanters dull yellow; femora dull yellow basally soon passing into brown; tibiae and tarsi brown.

Wings subhyaline, cells *C* and *Sc* more yellowish; stigma scarcely indicated; veins brown. Venation, *Rs* very short, *R2* obliterated. (See Plate XV, figure 1).

Abdomen with the two basal segments light brown; remainder of abdomen dark brown; hypopygium simple.

Holotype.—Male, Callanga, Peru, in the Hungarian National Museum.

The reference of this species to *Macromastix* is somewhat provisional. It agrees with *M. chilensis* Philippi[1] in its antennae and simple hypopygium, but the obliteration of vein R2 is a character suggesting certain of the *Dolichopezini*. I do not care to erect a new genus upon a single specimen. As I have shown before,[2] Enderlein's *M. appendens* (Zool. Jahrb., Vol. 32, pt. I, pp. 14, 15) is not a *Macromastix* at all, but a true *Tipula*.

[1] Philippi, Verh. Zool. bot. Gesell. Wien. Vol. 15, p. 617 (1865).

[2] Alexander, Ann. Ent. Soc. Am., Vol. 5, No. 4, p. 355 (1912).

Genus **Holorusia** Loew.

Holorusia flavicornis sp. n. (Pl. XV, fig. 2).

Antennæ of ♂ elongate, without bristles; thoracic dorsum rich chestnut; pleuræ yellow above, paler beneath, a dark lateral stripe; wings pale brown.

Male.—Length, 13.2 mm.; wing, 19.3 mm.; antennæ, about 7.5 mm. Fore leg, femur, 10.8 mm.; tibia, 12.3 mm.; tarsus, segment 1, 21.4 mm.

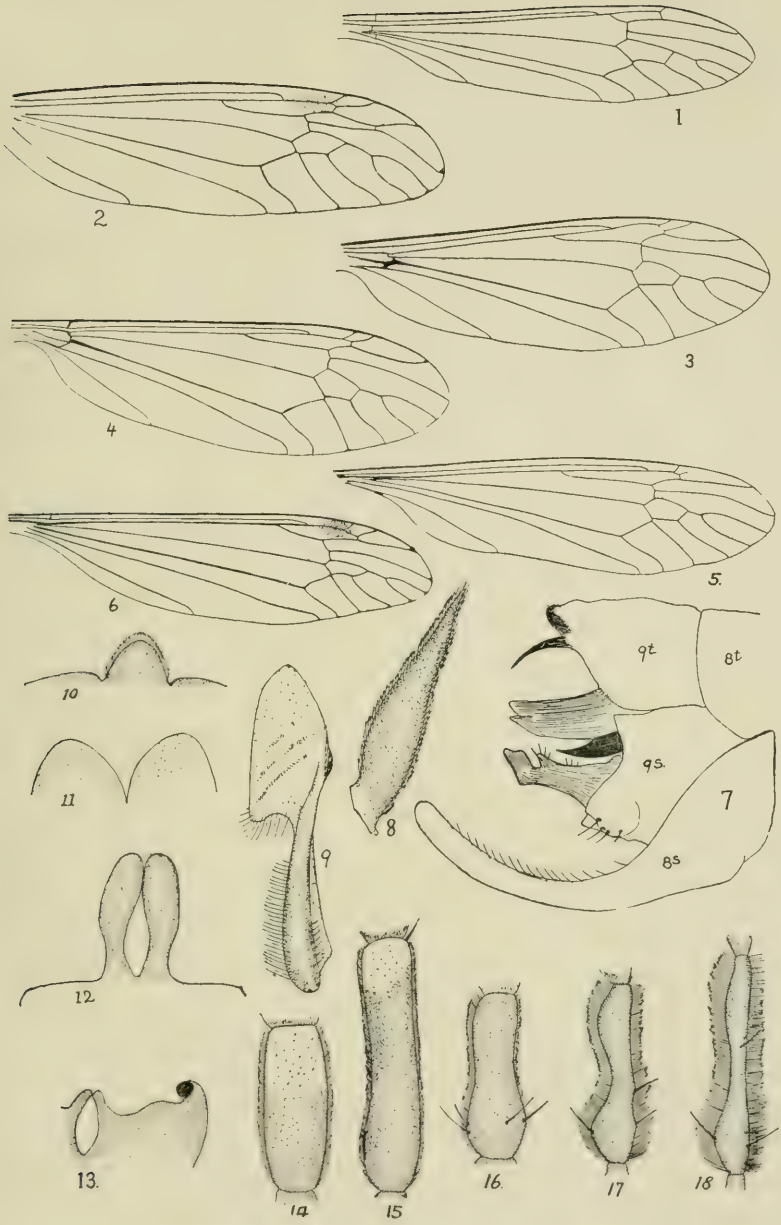
Palpi rather short, dark brownish black, the frontal prolongation of the head rather long, the nasus very long and sharply pointed, the prolongation is brown, rather darker on the sides; antennæ elongate, scapal segments very small, the first only a little longer than the second, the flagellar segments elongate cylindrical, not incised, without bristles but densely clothed with very short pale hairs; antennæ light yellow, the apical flagellar segments a little darker; head with a light brown median stripe, the sides behind the eyes rich chestnut brown.

Pronotum rich chestnut medially, light yellow on the sides, this color being the anterior end of a broad pale stripe underneath the mesonotal præscutum. Mesonotal præscutum rich chestnut brown, stripes not very distinct, the lateral margins of the sclerite rather darker; scutum dark brown; scutellum brown; postnotum dark brown in front, light dull yellow behind. Pleuræ rather pale; a yellow stripe, described above, running from the pronotum almost to the wing root; ventrad of this, a dark brown stripe running from the cervical sclerites almost to the wing root; ventral pleural sclerites brownish yellow. Halteres rather short, brown.

Legs, coxæ and trochanters dull yellow; femora yellowish brown, passing into brown, the tip dark brown; tibiæ brown, the extreme base pale, almost white; tarsi brown; legs long and slender.

Wings with a pale brown suffusion, cell *C* more yellowish, stigmal region dark brown; a brown cloud at the origin of *Rs;* subhyaline droplets in cell *1stR*1, end of *R*5, *M*1, base of *M*2 and tip of *1stA* near the vein *2ndA*. Venation, see Plate XV, figure 2. The wing figured shows an adventitious crossvein in cell *R*3 dividing this into two cells the other wing being normal.

Abdominal tergites brown, the genitalia more yellowish, sternites a little more yellowish. Hypopygium small, 8th tergite rather narrow, especially medially; 8th sternite rather short, produced caudad into a very short sheath for the 9th sternite. Ninth tergite rather square, the caudal margin deeply concave, the latero-caudal angles produced into prominent lobes which are somewhat divergent, the tips and caudal margin provided with numerous black bristles. Ninth sternite rather large, pleura not distinct, near the base of the sclerite on the



NEOTROPICAL TIPULIDAE, IV.—ALEXANDER.

ventro-median line underneath the protecting sheath of the 8th sternite is a median lobe directed ventrad, deeply divided medially to form two cylindrical lobes which are densely clothed with long, appressed silky hairs. Pleural region with the following appendages: a large pale external appendage, directed dorsad in a position of rest, its tip rather sharp-pointed, on its outer margin near the middle, with a prominent chitinized tooth, the whole appendage clothed with long pale hairs; inner appendage smaller, flattened, fleshy, pale, clothed with abundant pale hairs. Inside of the genital chamber, just beneath the lobes of the 9th tergite is a pair of irregular appendages very densely provided with small, rounded chitinized tubercles.

Holotype.—Male, Venezuela, ex. Coll. H. Fruhstorfer, in the Hungarian National Museum.

From the species of what seem to be *Holorusia pallidinervis* Mcqt. (Dipt. Exot., Suppl. I, p. 16) and *albocostata* Mcqt. (l. c., pp. 15, 16), this differs in its wing-pattern and long pale yellow antennae. From *H. maya* Alex. (Ann. Ent. Soc. Am., Vol. 5, p. 358, 1912) it differs in its much smaller size and quite different color.

Holorusia laevis, sp. n. (Pl. XV, figs. 8, 15).

Flagellum of antennæ without bristles; antennæ of ♂ moderately long, flagellum bicolored; mesonotum reddish brown with indistinct darker lines; wings light brown, a square spot in cell *M* near the middle of its length.

Male.—Length, 13.4 mm.; wing, 18 mm.; fore leg, femur, 11 mm.; tibia, 11.5 mm.; tarsus, segment 1, 19 mm.

Palpi moderate in length, dark brown; frontal prolongation of the head rather short, nasus very long and prominent, front light brown; antennæ moderately long, if bent back, extending a little beyond the wing root, segment 1 rather short, about one-half as long as the third segment, flagellar segments cylindrical, not constricted, unarmed with bristles except a small pair at the tip, segments 1 and 2 light brown, 3 dark brown, 4 to 8 dark brown, yellowish at the tip, 9 to the end dark brown, the entire flagellum densely covered with white downy hairs; head rich brown. (See Plate XV, fig. 15).

Pronotal scutum reddish brown, scutellum almost white. Mesonotal præscutum reddish brown with very narrow indistinct darker lines; scutum reddish brown; scutellum and postnotum pale yellowish white. Pleuræ uniform pale yellowish. Halteres rather long, brown.

Legs, coxæ and trochanters light yellow, femora light yellowish brown, dark brown at the tip; tibiæ brown, scarcely darker at the tip; tarsi brown.

Wings subhyaline, cells *C* and *Sc* brownish, stigmal region brown, a brown cloud at the origin of *Rs,* a square patch in the middle of cell *M* over the vein *Cu;* base of cell *M* dark.

Abdominal tergites 1-5 dull yellowish, 6-8 dark brown, 9 yellowish, pale; segments 3-6 pale on the lateral margin; apical sternites dark brown; 9th and caudal part of the 8th light yellow. Hypopygium: 9th tergite from above, rather quadrate, the caudal margin with a median notch, the whole posterior face provided with numerous black bristles as in this group of species (*flavicornis,* et al). Eighth sternite short, dark basally, pale reddish yellow apically; 9th sternite very elongate giving the caudal margin of the hypopygium an oblique appearance when viewed from the side, pleural suture incomplete; outer pleural appendage long, flat and tapering to a point, fleshy, pale, clothed with long hairs. (See Plate XV, fig. 8). Inner appendage short, fleshy, concave on the outer face.

Holotype.—Male, Asuncion, Paraguay, May 5, 1904 (Vezenyi), in the Hungarian National Museum.

Holorusia orophila sp. n. (Pl. XV, fig. 14).

Flagellum of antennæ without bristles; antennæ short, the flagellum bicolored; mesonotum light brown with about five narrow darker lines; wings with a square spot in cell *M* near the middle of its length.

Male.—Length, 13.5 mm.; wing, 16.8 mm. Fore leg, femur, 9.6 mm.; tibia, 10.8 mm.

Palpi rather short, dark brown; frontal prolongation of the head short, nasus very long and prominent, brown; antennæ short, if bent backward, not attaining the wing root; the first segment elongate as long as the succeeding three segments combined; flagellar segments short-cylindrical, without bristles; first three antennal segments dull yellow; segments 4-10 dark brown basally, yellow apically, terminal antennal segments dark brown; head dark brown, narrowly paler behind adjoining the eyes. (See Plate XV, figure 14).

Thoracic notum, præscutum light brown with about five narrow darker lines, one median and with two indistinct lateral stripes on either side; scutum and scutellum light brown, the latter paler, yellowish; postnotum dull yellow, darker on the sides. Pleuræ pale dull yellow, unmarked. Halteres rather long, brown, a little paler basally.

Legs, coxæ dull light yellow; trochanters and femora yellowish brown, the latter a little darker at the tip, tibiæ and tarsi brown.

Wings subhyaline; cells *C* and *Sc* brown; stigma brown; a brown spot in cell *M* near the middle of the length of *Cu;* cells *R* and *M* brown at the base.

Abdomen with the basal tergites dull yellow; 5-6 with a broad brown median stripe; 7 with the caudal margin dark brown; 8 en-

tirely dark brown; 9 yellowish. Sternites 1-6 dull brownish yellow, the apical sternites dark brown.

Holotype.—Male, San Lorenzo, Sierra, Colombia (Ujhelyi), in the Hungarian National Museum.

Holorusia peruviana sp. n.

Flagellum of antennæ without bristles; antennæ dark brown; mesonotum light brown with broad brown stripes; wings without well defined markings.

Male.—Length, 13.3 mm.; wing, 17.1 mm.; fore leg, femur, 7.8 mm.; tibia, 8.9 mm.; tarsus, 14.2 mm.

Palpi short, dark brown; frontal prolongation of the head very short and stout, brown, nasus distinct, large; antennæ, scapal segments short, brown, flagellar segments elongate-cylindrical, dark brown, without bristles, but clothed with a dense fine pubescence; head brown, a median line and the region adjoining the eyes very dark brown.

Mesonotal præscutum pale with three broad brown stripes, the median one very broad, bisected by a dark brown line; scutum brownish gray; scutellum and postnotum light gray with a narrow indistinct brown median line. Pleuræ with a broad light band across the dorsal sclerites extending from the pronotum to the wing root; median pleural sclerites light gray with three oval dark brown spots which form an interrupted lateral band; mesosternum gray with a light brown suffusion. Halteres rather long, brown, pale at the extreme base.

Legs, coxæ light gray; trochanters dark brown; femora brown, darker at the tip; tibiæ and tarsi brown.

Wings with a light gray suffusion; stigma light brown; a rounded gray cloud at the origin of *Rs;* a subhyaline blotch in cell 1*stA* at the margin. Venation: Cell 1*stM2* very long, petiole of cell *M*1 short or lacking.

Abdominal tergites light brown, a slightly darker median stripe; segments 6-8 dark brown; sternites, segment 1 dark brown, 2-5 light yellow, dark brown medially, 6-8 dark brown.

Holotype.—Male, Callanga, Peru, in the Hungarian National Museum.

The reference of some of the above species to *Holorusia* is doubtful, but they agree better with that genus than with the typical *Tipula* and so I describe them as species of *Holorusia.*

Genus **Tipula** Linnaeus.

Tipula gladiator sp. n. (Pl. XV, figs. 6, 7).

Antennæ of the male elongate, basal segments yellow, flagellum dark brown; thorax dark grayish brown; wings dull yellowish; 8th sternite of the ♂ genitalia produced caudad into a long curved sabre-like appendage.

Male.—Length, 16.2 mm.; wing, 14 mm.

Palpi with the basal segments a little darker than the dull yellow apical segments; frontal prolongation of the head short, nasus distinct, darker brown above, more yellowish beneath and on the sides; antennæ elongate, if bent backward extending about to the 3rd abdominal segment; segments 1 and 2 light yellow, flagellar segments dark brown covered with short pale hairs; the segments not cylindrical, but feebly incised on the lower face; head gray, a little clearer on the occiput.

Pronotal scutum dark brown bordered with gray. Mesonotal præscutum brown with indistinct darker brown stripes of which the median one is double; scutum brownish gray; scutellum brown; postnotum light gray. Pleuræ pale with a clear light gray bloom on the mesopleuræ. Halteres brown, pale at the base.

Legs, coxæ pale yellow with a sparse grayish bloom, most pronounced on the fore coxæ; trochanters dull yellow; remainder of legs broken.

Wings with a brownish yellow suffusion; stigma oval, brown. Venation as in Plate XV, figure 6.

Abdominal tergites dark brown; a large triangular yellow blotch on the sides of the second segment on the caudal half; genitalia yellowish; two basal sternites dull yellow, 3-7 dark brown. Hypopygium: Eighth tergite broad; 8th sternite with the caudal margin produced backward in a long curved appendage, much exceeding the remaining parts of the hypopygium; its dorsal face concave, the appendage sparsely clothed with short appressed hairs. Ninth tergite with a blunt lobe on the caudal margin on either side of the concave median portion, the latero-caudal angles produced backward into long, slender, chitinized spines which are directed caudad and slightly ventrad; 9th sternite small. Appendages which seem to come from the pleural region are: first, a ventral appendage, irregular, rather chitinized apically, its dorsal margin near the tip with a rounded notch; second appendage, above the first, a sharp, heavily chitinized spine directed caudad; third appendage, large, feebly chitinized, its apex notched (possibly median in position as it seems to be unpaired); fourth, dorsad of these three appendages and just underneath the spines of the 9th tergite is a sub-fleshy lobe more chitinized apically, clothed with long delicate hairs (not shown in the figure). Lateral aspect of the hypopygium shown in Plate XV, figure 7.

Holotype.—Male, Theresopolis, Brazil, in the Hungarian National Museum.

The remarkable hypopygium of the male at once separates it off from the other species in the Neotropical fauna.

Tipula guarani sp. n.

Antennæ brownish yellow; thorax brownish gray with brown stripes; femora brownish yellow, tip broadly brown; wings hyaline with brown spots and gray clouds.

Female.—Length, 33 mm.; wing, 23.2 mm.; fore leg, femur, 11.6 mm.; tibia, 14.4 mm.

Palpi rather long, the three basal segments rather stout, the last segment slender, palpi dark brown; frontal prolongation of the head rather long, brown; antennæ, segment 1 elongate, first flagellar segment rather stout, antennæ brownish yellow; head pale yellowish brown with a narrow stripe of dark brown.

Thoracic pronotum pale gray, dark brown medially. Mesonotal præscutum light brownish-gray with dark brown stripes, the median stripe broadest in front, a little narrowed behind, the thoracic stripes contrasting strongly against the pale ground color; scutal lobes largely brown with an isolated rounded brown spot on the cephalic margin of each lobe, this being the caudal end of the lateral præscutal stripe; median portion of the scutum brown; scutellum and postnotum grayish brown medially. Pleuræ dull gray with brown spots on the mesopleuræ. Halteres rather long, brown, the knob darker.

Leg, coxæ grayish brown; trochanters dull yellow; femora brownish yellow, the tip broadly dark brown; the fore legs, especially, show a broad yellow subapical ring; tibiæ brownish yellow, the tip indistinctly darker; tarsi brown.

Wings hyaline with brown spots and gray clouds, as follows: Brown spots at the base of the wing, midlength of the distance between the base of *R*1 and the origin of the sector; at origin of *Rs*, stigmal region, brown seam to vein *Cu* and most of the crossveins and deflections of veins; tip of cells *R*2 and *R*3 grayish brown; gray clouds in all the caudal cells of the wing. Venation: *Rs* long, slender, lying rather close to *R*1; crossvein *m-cu* present.

Abdominal tergite 1 brownish gray; 2-8, dull orange-yellow, a little suffused with darker; segment 9 and ovipositor brown; sternites yellow, median line brown. Ovipositor, tergal valves very long, very slender and straight, the margins smooth, tips scarcely expanded, sternal valves short.

Holotype.—Female, Rio Grande, Brazil, in the Hungarian National Museum.

The specific name is that of a native Indian tribe.

Tipula oblique-fasciata Macquart.

One female from Chiriqui, Central America.

Tipula sp.

One female, *monilifera* group, Mexico.

Tipula apterogyne Philippi.

Three males, Concepcion, Chile; P. Herbst, 1903, 1904.

Tipula abortiva sp. n.

Female with rudimentary wings; wings black with a whitish cross-vein in the neighborhood of the cord.

Female.—Length, 16 mm.; wing, 8 mm.; fore leg, femur, 5.3 mm.; tibia, 5.4 mm.; tarsus, 6.1 mm.

Palpi short, dark brownish black; frontal prolongation of the head brown, the nasus rather prominent; antennæ, segments 1 and 2 brown; flagellum brownish black; head light brown, more gray on the occiput, with a very indistinct, narrow brown median line best indicated on the occiput.

Pronotal scutum dark brownish black, a little paler on either side behind; scutellum pale grayish with three brown marks. Mesonotal præscutum suffused with dark brownish black in front, light gray with three very pale brown stripes, the median one broadest, the lateral ones very indistinct. Scutum, scutellum and postnotum dull gray, the two latter with an indistinct median brown mark. Pleuræ mostly dark brown. Halteres rather short, brown.

Legs, coxæ grayish brown; trochanters brownish yellow; femora, tibiæ and tarsi dark brown.

Wings very short, dark brown with a faint white crossband across the cell 1st*M2* extending from the end of cell *R* to the middle of cell *M3*.

Abdominal tergites with segment 1 brown, segments 2-8 reddish brown, the lateral margins suffused with brown; sternites reddish brown, the segments with an indistinct median brown mark; segments 8-9 dark brown; caudal segments of body and ovipositor shiny; tergal valves of the ovipositor long, slender, straight; sternal valves much shorter.

Holotype.—Female, Callanga, Peru, in the Hungarian National Museum.

Tipula campa sp. n. (Pl. XV, figs. 5, 9-12, 18).

Color of the thorax light gray; basal abdominal segments orange-yellow; subterminal segments dark brown; antennæ of the ♂ very long.

Male.—Length about 11 mm.; wing, 14.4 mm.; fore leg, femur, 8 mm.; tibia, 8.6 mm.; tarsus, 11 mm.

Palpi very short, dark brown; frontal prolongation of the head short, light gray; antennæ very long, if bent backward extending about to the eighth abdominal segment, scapal segments light brown, flagellar segments very dark brown; after the first, each segment is swollen at its base and less so before its tip, provided with a few black bristles and abundant long pale hairs. (See Plate XV, figure 18). Front with a well defined tubercle which is bisected by a deep median furrow; head gray.

Pronotum dark brown, bordered with gray; mesonotal præscutum very light gray with four bright brown stripes, one on either side of the median line, pale and indistinct in front, clearer behind; lateral stripes short, lateral margin of the sclerite of the same color; scutum gray, the anterior end of each lobe with a rounded chestnut brown spot; scutellum and postnotum light gray, the latter dusky on the sides. Pleuræ clear light gray. Halteres light brownish yellow basally, passing into brown.

Legs, coxæ light gray, trochanters yellow; femora light brown, dark brown at the tip; tibiæ and tarsi brown.

Wings subhyaline, cells *C* and *Sc* pale brown, a brownish tinge in the vicinity of the stigma, at ends of cells *R2* and *R3*; hyaline blotches not well defined. Venation, see Plate XV, figure 5.

Abdomen, tergites 1-4 bright yellow, 5-8 passing into brown; 9 light yellow; sternites yellowish; the lateral margins of the tergites are broadly dark brown. The male genitalia with the 8th tergite broad, dark colored, except at the base where it is reddish; 9th tergite very pale yellow, viewed from above (see Plate XV, figure 11), large, subquadrate, the outer lateral angles rounded, caudal margin with a very deep median notch; viewed from the side the caudo-lateral margin with a rather sharp protuberance. Eighth sternite (Plate XV, figure 10) with the caudal margin rounded and with a prominent median protuberance. Ninth sternite (from beneath, see Plate XV, figure 12) with the caudal margin produced backward as a prominent, sub-lyriform appendage; viewed from the side, the 9th sternite is small, the pleural piece complete, almost oval, its ventro-caudal margin applied closely to the caudal appendage of the 9th sternite. Pleural appendages two, the more cephalic and dorsal being a long, cylindrical fleshy appendage, pale, clothed with long hairs, directed dorsad; the second appendage is large, viewed from behind (see Plate XV, figure 9); it is slender basally, with the inner part of the base clothed with long pale hairs, the tip expanded out like a knife blade, meeting its mate of the opposite side on the median line, the caudal face of this blade with a few transverse ridges, the outer face somewhat chitinized, in contact with a chitinized appendage having the same general blade-like shape which lies between the caudal appendage and the 9th tergite.

Holotype.—Male, Callanga, Peru, in the Hungarian National Museum.

The specific name, *campa,* is that of a native Indian tribe living in eastern Peru.

This species and the two following belong to the same group of species as *inca* Alexander,[3] possessing short palpi, short legs, and the peculiar genitalia of the male as described above. These three species are closely related to one another and differ from *inca* in the bright orange-yellow color of the abdominal tergites, in the structure of the antennae, etc.; they are separable amongst themselves by very striking differences in the antennae of the male and in the details of the male hypopygium.

Tipula piro sp. n. (Pl. XV, figs. 4, 13, 17).

Color of the thorax light gray; basal abdominal segments orange yellow; subterminal segments dark brown; antennæ of ♂ moderate in length.

Male.—Length, 12.3 mm.; wing, 15.5 mm.; fore leg, femur, 8.4 mm.; tibia, 9.6 mm.; tarsus, 13 mm.

Palpi very short, dark brown; frontal prolongation of the head moderate in length, grayish, tinged with brown on the sides; antennæ moderately long, if bent back they would extend about to the base of the fourth abdominal segment, the scapal segments light brown, flagellum dark brown, the ventral face of each flagellar segment very deeply incised (see Plate XV, figure 17); head gray tinged with brownish.

Thorax light gray; pronotum with a short, dark brown median line; mesonotal præscutum light gray with a very narrow, indistinct median brown line, and, behind, with indications of a pale brown stripe on either side of the middle; lateral margin of the sclerite and a short lateral stripe brown, the latter much lighter and brighter; scutum light gray with two bright brown rounded spots on each lobe; scutellum and postnotum light gray suffused with dusky on the sides. Pleuræ light gray, a large brown spot on the mesoepisternum and another on the mesoepimerum. Halteres rather long, brown, paler at the base.

Legs, coxæ gray, trochanters and femora brown; tibiæ and tarsi darker brown.

Wings with a faint brown tinge, cells *C* and *Sc* yellowish; hyaline

[3] Ann. Ent. Soc. Am., Vol. 5, pp. 351, 352; pl. 24, fig. c.; pl. 25, fig. 1, (1912).

spots on the wing disk, one being in cell *1stM2*, another in the middle of cell *M*, etc. Venation as in Plate XV, figure 4.

Abdomen with the first tergite gray; 2-4 bright yellow, remainder brown, including the genitalia; lateral margins of the tergites broadly dark brown; sternites dull yellow. The genitalia agree with *T. campa*, differing as follows: Ninth tergite (see Plate XV, figure 13) with the caudal margin more tuberculate, on either side of the elongate-oval median notch is a short, cylindrical lobe, the caudolateral angles slender and reflexed; 8th sternite dark brown, only the median lobe being paler; the second pleural appendage, viewed from behind, has the narrowed base very elongate, the blade relatively small, the whole appendage being hidden beneath the 9th tergite.

Holotype.—Male, Callanga, Peru, in the Hungarian National Museum.

The specific name, *piro*, is that of a native Indian tribe of eastern Peru.

Tipula curinao sp. n. (Pl. XV, figs. 3, 16).

Color of the thorax light gray; basal abdominal segments orange yellow, subterminal segments dark brown; antennæ short.

Male.—Length, 12 mm.; wing, 15.5 mm.; fore leg, femur, 8.1 mm.; tibia, 9 mm.

Palpi very short; frontal prolongation of the head moderate, grayish brown; antennæ short, if bent backward, extending about to the base of the halteres, dark brownish black, the scapal segments alone a little paler, flagellar segments short, cylindrical, the base enlarged (see Plate XV, figure 16); frontal tubercle rather prominent; head dull yellow, more brownish in the middle of the vertex and on the occiput.

Pronotum dark brown; mesonotal præscutum light gray, the lateral margin of the sclerites very dark brown, a very broad light brown median stripe, broadest in front, narrowed behind, partially bisected from behind by a pale line, lateral stripes of the same color; scutum light gray with two light brown spots on each lobe; scutellum and postnotum light gray with a brown median vitta and with the sides of the sclerites tinged with dusky. Pleuræ brown with a sparse gray bloom. Halteres rather long, brown.

Legs, coxæ and trochanters brown; femora reddish brown passing into brown at the tip, and with an indistinct yellowish brown annulus before the tip; tibiæ and tarsi dark brown.

Wings light brown, cells *C* and *Sc* a little brighter; a dark brown spot at the origin of *Rs* and others in the stigmal area; a hyaline spot in cell *1stM2* and a smaller one in cell *M*. Venation as in Plate XV, figure 3.

Abdomen, tergites 1-7 orange yellow, the lateral margins broadly brownish black, segments 8-9 dark brown; sternites orange, apical sternites more brownish. The genitalia agree with *T. campa,* differing as follows: Ninth tergite without a median incision on the caudal margin; 8th sternite about as in *campa* but the lobe larger and more pronounced; 9th sternite with a great median notch which divides the segment into two except behind; the inner angles of each of the lobes thus formed is a rounded ball densely clothed with long hairs; the second pleural appendage has the blade very small and inconspicuous, the appendage being mostly stem.

Holotype.—Male, Callanga, Peru, in the Hungarian National Museum.

The specific name, *curinao,* is that of a native Indian tribe of eastern Peru and western Bolivia.

Genus **Microtipula** Alexander.

Microtipula amazonica Alexander.[4]

One male from Surinam (Michaelis).

Genus **Pachyrrhina** Macquart.

Pachyrrhina consularis Osten Sacken.

Seven specimens in the collection that agree sufficiently with *consularis;* that this last named species is specifically distinct from *P. elegans* Fabricius, as stated by Osten Sacken, is by no means certain. The present material is as follows:

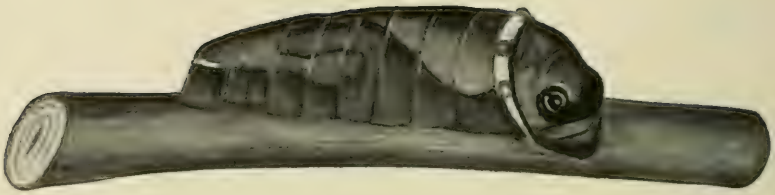
Bolivia, Coroico, 1 female; Peru, Vilcanota, 1 male; Brazil, Rio Grande, 1 female; Paraguay, San Bernardino, March, 1908 (Fiebig), 2 females, 1 male; Argentina (Vezenyi), 1 male. The Peruvian specimen and one of the San Bernardino females have been retained; the remainder of the material is in the collection of the Hungarian National Museum.

EXPLANATION OF PLATE XV.

Figure 1. Wing of *Macromastix pygmaea,* sp. n.
Figure 2. Wing of *Holorusia flavicornis,* sp. n.
Figure 3. Wing of *Tipula curinao,* sp. n.
Figure 4. Wing of *Tipula piro,* sp. n.
Figure 5. Wing of *Tipula campa,* sp. n.
Figure 6. Wing of *Tipula gladiator,* sp. n.

[4] Ann. Ent. Soc. Am., Vol. 5, pp. 361, 362; pl. 24, fig. i; pl. 25, fig. q (1912).

1.



2.

1.—EUPHYDRYAS PHAETON NEAR FORM STRECKERI.—FRANZEN.

2.—PAPILIO HOMERUS, LARVA.—SWAINSON AND SKINNER.

Figure 7. Hypopygium of *Tipula gladiator*. Lateral aspect; 8*s*, 9*s*, equal 8th and 9th sternites; 8*t* and 9*t* equal 8th and 9th tergites.

Figure 8. Hypopygium of *Holorusia laevis*, sp. n. Lateral aspect of the pleural appendage.

Figures 9-12 Hypopygium of *Tipula campa*, sp. n. 9, 2nd pleural appendage from behind; 10, 8th sternite, ventral aspect; 11, 9th tergite, dorsal aspect; 12, 9th sternite, ventral aspect.

Figure 13. Hypopygium of *Tipula piro*, sp. n., 9th tergite, dorsal aspect.

Figure 14. Sixth antennal segment of ♂ *Holorusia orophila*, sp. n.

Figure 15. Sixth antennal segment of ♂ *Holorusia laevis*, sp. n.

Figure 16. Sixth antennal segment of ♂ *Tipula curinao*, sp. n.

Figure 17. Sixth antennal segment of ♂ *Tipula piro*, sp. n.

Figure 18. Sixth antennal segment of ♂ *Tipula campa*, sp. n.

Minnesota Butterflies (Lepid.).

By John Werner Franzen, Minneapolis, Minn.

(Plate XVI, fig. 1.)

The following list of butterflies taken in Minnesota, mostly from Hennepin County, with dates of capture and notes on distribution, is based on the collection of the author, and those of the Museum of the Academy of Science, and at the University of Minnesota.

I acknowledge gratefully the assistance of Professor Oscar W. Oestlund of Minnesota University; Dr. Harrison G. Dyar, of Washington, and Mr. P. O. Fryklund, of Badger, Minn., in the preparation of this list.

Where only two dates are given, they represent the earliest and the latest records. The numbers in brackets refer to Dyar's List of North American Lepidoptera, U. S. N. M. Bull. No. 52.

Family Papilionidae.

1 (5b) **Papilio ajax** var. **marcellus** Bd. Lec. Zebra Swallow tail.

A single specimen in the University collection taken in the downtown districts of the city of Minneapolis; evidently accidental and escaped from some pupae brought in by shipment.

2 (11a) **Papilio glaucus** var. **turnus** Linn. Tiger Swallow tail.

The distribution of this species in the state is peculiar. In Hennepin and Ramsey Counties it is rare, while about 50 miles northeast of Minneapolis close to the Wisconsin line, it is common. At

Lake Vermillion and at Badger and Roseau it is found in countless thousands. I have a large number of specimens from Roseau taken in May and June. One specimen from Minneapolis, May 25.

3 (13) **Papilio troilus** Linn. Green-clouded Swallow tail.

Rare; in the vicinity of Minneapolis I have only seen two or three specimens during the past ten years. One specimen from Hennepin County, July 15.

4 (14) **Papilio thoas** Linn. Giant Swallow tail.

One specimen in the University collection taken close to the city of Minneapolis, much worn and battered and evidently a migrant from the south.

5 (22) **Papilio polyxenes** Fab. Black Swallow tail.

This is a common butterfly in the state, from April to middle of September; specimens from Fort Snelling April 10, May 30, July 13, July 31 and September 5. One specimen from Badger, Roseau County, July 6.

Family Pieridæ.

6 (37) **Pontia protodice** Bd.-Lec. Checkered White.

Common. In the summer of 1910 this species outnumbered the rapæ ten to one. In 1912 the rapæ was again predominating. July 13, October 15.

7 (37a) **Pontia protodice** var. **vernalis** Edw.

In the University collection from Lake Superior district and one specimen from Minneapolis.

8 (38) **Pontia napi** Linn. Gray-veined White.

Rare; in this vicinity, but common in the northern parts of the state. Specimens from Roseau County, August 17, 1912. There are two specimens in the Academy's collection labeled Minneapolis.

9 (40) **Pontia rapae** Linn.

Very common; and at times extremely abundant. Specimens from Minneapolis April 10, October 14. In University collection from Cass County, July 7, 1893.

10 (41) **Nathalis iole** Bd. Dainty Sulphur.

Rare. I have one specimen from Fort Snelling, August 13, 1911. In University collection from Anoka County, September 30, 1897, and from Lake Nokomis, Hennepin County, August 30, 1912.

11 (52) **Callidryas eubule** Linn. Cloudless Sulphur.

One specimen from Faribault, July 12, 1912, taken by Mr. C. Webster, and is now in his collection.

12 (61) **Zerene caesonia** Stoll. Dog's-Head.

Common. It was unusually abundant in this vicinity in the summer of 1907. In 1908 and 1909 but a few appeared, and in 1910 it was totally absent. In 1912 about half a dozen were seen, while in 1913 it again was very common. June 15, August 25.

13 (61a) **Zerene caesonia** var. **rosa** McN.

Of this interesting form I have one specimen, taken at Fort Snelling late in the fall of 1905.

14 (65) **Eurymus eurytheme** Bd. Orange Sulphur.

Common. This species was more abundant in 1908 than at any other year within my memory. In 1909 and 1910 it was rare, in 1912 it again appeared in large numbers, while in 1913 it was scarce. In the female of this species in late summer a form occurs (albinic var). My earliest record of any such forms is August 25.

15 (65) **Eurymus philodice** God. Roadside Sulphur.

Common; but is never found in such large numbers as the preceding species. Like *eurytheme,* the female of this species is subject to albinism. I have taken such albinos as early as July 4. Of the typical form *philodice* I have several specimens from Roseau County. From Minneapolis, June 30, October 17.

16 (81) **Pyrisita mexicana** Bd. Mexican Sulphur.

One specimen taken by Mr. C. Webster at Fort Snelling, October 5, 1912.

17 (85) **Eurema euterpe** Men. Little Sulphur.

Rare. I have one specimen taken at Columbia Heights, northeast Minneapolis, August 28, 1912.

Family Nymphalidae.

18 (92) **Euptoieta claudia** Cr. Variegated Fritillary.

Not very common in this vicinity. I took my first specimen of this species in 1908, and have since taken several every summer. This species goes much further north than formerly supposed. I have specimens from Roseau County although it is not common there. Specimens from Minneapolis, June 25, October 15. A number of larvae of this species found feeding on garden pansy in his garden by Mr. H. H. Welch of this city and reared to imagos in 1913.

19 (95) **Speyeria idalia** Dru. Regal Fritillary.

Common locally; in July and August in open fields. In the northwest corner of Fort Snelling reservation, on an area of about 60 acres, numbers of these butterflies can be found every summer, while outside of this tract they are totally absent. Specimens from Fort Snelling, July 4, September 5. Reported as common in the Red River valley, between Fergus Falls and Crookston, by M. P. Somes, 1912.

20 (99) **Argynnis cybele** Fab. Great Spangled Fritillary.

This, the commonest of the larger fritillaries in the state, flies from June to September. Very common at Badger and Roseau (Fryklund). Specimens from Fort Snelling, June 12, August 7.

21 (100) **Argynnis aphrodite** Fab. Aphrodite.

Rare. I have only two specimens from the state. Fort Snelling, July 6, 1911, August 11, 1912.

22 (100a) **Argynnis aphrodite** var. **alcestis** Edw.

Rare. I have three specimens from Fort Snelling, June 12, 1910, and July 4, 1913.

23 (102) **Argynnis atlantis** Edw. Mountain Fritillary.

Very rare in this vicinity. More common in the extreme northern parts of the state. There is one specimen in the Academy's collection labeled Minneapolis. I have three specimens from Roseau County, August 18, September 2, 1912, and June 22, 1913. Also in the University collection from Cass County, July 2, 1893. Reported from Duluth, Allen Junction and Burntside Lake, 1912 (Somes).

24 (131) **Brenthis myrina** Cr. Silver-bordered Fritillary.

Very common, in low meadows throughout the summer.

25 (141) **Brenthis bellona** Fab. Meadow Fritillary.

Much rarer than the preceding species. It was unusually abundant in the vicinity of the Twin Cities during the later part of June and early July, 1913. Specimens from Badger, Roseau County, July 13, 1913; from Minneapolis, May 25, August 29. In University collection from Hamilton, Minn., June 30.

26 (146) **Euphydryas phaeton** Dru. Baltimore.

Common, in meadows, in June and July. From Minneapolis, July 4, and from Hopkins, June 18.

27 **Euphydryas phaeton** near form **streckerii** Ellsw. (Plate XVI, fig. 1).

This interesting specimen was taken at Hopkins, June 18, 1911. I am indebted to Dr. Dyar for the identification.

28 (169) **Cinclidia harrisii** Scud. Harris's Butterfly.

Rare. One specimen taken at Minneapolis, June 18, 1911, by C. Webster.

29 (185) **Charidryas nycteis** Dbl.-Hew. Silver Crescent.

Common. Specimens from Minneapolis, June 15, June 26. In University collection from Cass County, June 15, July 20.

30 (186) **Charidryas ismeria** Bd.-Lec. Ismeria.

I have only taken one specimen. There are five in the Academy's collection from Minneapolis, also in University collection from Ramsey County.

31 (189) **Phyciodes tharos** Dru. Pearl Crescent.

There are several specimens in the Academy's collection from Hennepin County. In University collection from Cass County, June 17, 1893.

32 (189a) **Phyciodes tharos** var. **morpheus** Fab.

Very common; all over the state from June to September. June 15, August 18.

33 (205) **Polygonia interrogationis** Fab. Violet Tip.

Common. The Academy's collection contains a number of specimens from the state.

34 (205a) **Polygonia interrogationis** var. **umbrosa** Lint.

Very common. I have specimens from Fort Snelling, June 25, July 3, August 31.

35 **Polygonia comma** Harr. Hop Merchant.

Common. The hibernating brood of this species appears early in April, when it can be seen in company with *antiopa,* sipping the sap from wounded trees. Specimens from Fort Snelling, April 10, July 27, August 13-20, and September 27. From Northome, July 20.

36 (206a) **Polygonia comma** var. **dryas** Edw.

Common; it was very numerous in this vicinity during the first week of July, 1913; June 22, July 6.

37 (209) **Polygonia faunus** Edw. Green Comma.

Not common; only found in the northern parts of the state. One specimen from Itasca County, July 23, 1910.

38 (214) **Polygonia progne** Cr. Gray Comma.

Rare; in this vicinity. I have only one specimen from Hennepin County.

39 (215) **Eugonia J.-album** Bd.-Lec. Compton Tortoise.

A rare insect all over the state. Have only seen and taken two specimens. One specimen from Northome, July 23, 1910.

40 (217) **Euvanessa antiopa** Linn. Mourning Cloak.

Very common throughout the summer, and occasionally seen on the wing on warm days in February.

41 (218) **Aglais milberti** God. American Tortoise-shell.

Not common. I have one specimen from Minneapolis, July 17, and from Roseau County, August 12.

42 (219) **Vanessa atalanta** Linn. Red Admiral.

Common; in some years very common. It was very abundant in 1912 and 1913. Specimens from Fort Snelling, June 18, August 10.

43 (220) **Vanessa huntera** Fab. Painted Beauty.

Not common. I have not seen over half a dozen specimens in any one season. July 8, August 10.

44 (221) **Vanessa cardui** Linn. Cosmopolite.

Common in most years, but scarce in others. Before the destroying hand of man fell on the thistles that formerly grew below Minnehaha Park, these butterflies could be found in large numbers there. Now, the thistles are gone and so are the cosmopolites. July 8, August 31.

45 (223) **Junonia caenia** Hüb. Buckeye.

My first capture of this butterfly was on August 10, 1908. Since, I have taken specimens, July 4, 1911, September 2, 1912, July 4 and August 17, 1913. It is not common. Reported from Crookston and Fergus Falls (Somes).

46 (236) **Basilarchia astyanax** Fab. Red-spotted Purple.

During all my rambles with the net I never met with this fine spe-

cies until in the summer of 1913. On the 26th of June, while returning from a collecting trip, I saw one of these beautiful creatures resting on a branch of a linden, but I did not succeed in catching it. On the following Sunday, the 29th, I had better luck, as I caught one then and two more on July 6. It is very rare in this vicinity.

47 (237) **Basilarchia arthemis** Dru. Banded Purple.

Common; it was very abundant during June, 1913. Reported as common at Badger and Roseau (Fryklund). Specimens from Fort Snelling, June 22, August 1. In University collection from Cass County, June 17.

48 (239) **Basilarchia archippus** Cr. Viceroy.

Common, from June to middle of September. June 11, August 17.

49 (244) **Chlorippe celtis** Bd.-Lec. Gray Emperor.

Rare. I have one male and one female taken at Fort Snelling, July 17, 1909, and one female from the same locality, July 6, 1913. Recorded from Redwood Falls, July 1, 1912. (Somes).

50 (248) **Chlorippe clyton** Bd.-Lec. Tawny Emperor.

Rare. I have one male taken July 17, 1909, and one female, July 4, 1913, at Fort Snelling.

Family Agapetidae.

51 (258) **Cercyonis alope** var. **nephele** Kby. Dull-eyed Grayling.

Very common, from June to October. July 4. September 2.

52 (281) **Coenonympha ochracea** Edw. Ochre Ringlet.

Rare. One specimen from Hennepin County.

53 (284) **Coenonympha typhon** Rott. Plain Ringlet.

Rare. I have one specimen from Hopkins, August 5, 1910, and one from Frazee, June 29, 1913. I follow the classification of Dyar as to the name *typhon,* but my specimens differ very much from the European *typhon,* the latter having on the under side of the hind wing several black, white-pupilled ocelli in light yellow rings.

54 (286) **Enodia portlandia** Fab. Pearly Eye.

This species was totally absent in this vicinity during the summer of 1912. In 1913 but a very few were seen; in other years very common. Specimens from Fort Snelling, June 26, July 11. In University collection from Cass County, July 7.

55 (288) **Satyrodes canthus** Linn. Eyed Brown.

Like the preceding species, it was absent in 1912. In other years, common in swampy places in June and July. From Minneapolis, June 30. July 4. Common in Roseau County (Fryklund).

56 (299) **Cissia eurytus** Fab. Little Wood Satyr.

This little butterfly is common in the state, flying from late in May to middle of July. It prefers sparsely wooded tracts with underbrush.

Family Lymnadidae.

57 (308) **Anosia plexippus** Linn. Monarch.

Very common. This familiar butterfly is always very numerous in late summer. Its migratory habit is well known. In this vicinity single individuals begin to appear as early as April 29. In the first week of September they begin to assemble in large numbers preparatory to their southward journey. One of these assembling places is located on 54th Street South and the River Parkway below Minnehaha Park. The writer has seen the trees covered with these gaudy creatures for two solid blocks at this place. By the middle of September they are usually gone, but belated ones may be seen much later. I have seen single individuals as late as October 23. May 11, October 9.

Family Libytheidae.

58 (311) **Hypatus bachmani** Krlt. Long-beak.

One specimen in University collection from Faribault.

Family Lycaenidae.

59 (339) **Thecla acadica** Edw. Acadian Hair-streak.

Common; in marshy places in July. From Fort Snelling, July 6, July 21.

60 (345) **Thecla edwardsi** Saund. Edward's Hair-streak.

I have one specimen from Fort Snelling, July 20, 1913. The Academy's collection contains 6 specimens from Minneapolis.

61 (347) **Thecla calanus** Hüb. Banded Hair-streak.

Very common, in June and July. I was much impressed with the abundance of these little butterflies during the first week of July, 1913. At Fort Snelling they were swarming by the thousands in the open clearings of the woods. From Fort Snelling, June 26, July 6. In University collection from Red Rock, Washington County, July 9, 1899.

62 (349) **Thecla liparops** Bd.-Lec. Striped Hair-streak.

Rare. I know of only one specimen taken at Frazee, by Mr. C. Webster, in the summer of 1913.

63 (384) **Strymon titus** Fab. Coral Hair-streak.

Not common in this vicinity. Specimens from Fort Snelling, June 25, 1911, July 5, 1912, July 20, 1913.

64 (390) **Gaeides dione** Scud. Great Copper.

Common, in marshy places from middle of June to middle of July. Very numerous during the first week of July, 1913.

65 (393) **Chrysophanes thoe** Bd. Bronze Copper.

Rather rare. From Fort Snelling, June 15, August 24. Also in University collection.

66 (396) **Epidemia helloides** Bd. Purplish Copper.

In some years common locally, in low meadows in June and July.

Very numerous during July, 1913. From Fort Snelling, June 15, September 6.

67 (399) **Heodes hypophleas** Bd. American Copper.

Common, from June to October. June 10, August 2.

68 (420) **Nomiades lygdamas** Dbl. Silvery Blue.

I found this species in large numbers at Columbia Heights, Minneapolis, May 12, 1913, but taken as a whole it is rather rare. May 1, May 12.

69 (432) **Rusticus scudderi** Edw. Scudder's Blue.

I have two specimens taken on the Minnesota Geological and Natural History Survey, July 11, 1893.

70 (440b) **Cyaniris ladon** var. **marginata** Edw. Marginated Spring Form.

From Fort Snelling, May 1, 1910.

71 (440c) **Cyaniris ladon** var. **violacea** Edw.

Wayzata, May 17, 1914.

72 (440f) **Cyaniris ladon** var. **neglecta** Edw.

This form is more common than the preceding. From Fort Snelling. June 15, July 4 and August 11. I have one female taken at Fort Snelling, July 4, 1913, that corresponds with the typical *ladon ladon* Edw. only a trifle smaller, but to be on the safe side I let it pass as *neglecta*.

73 (442) **Everes comyntas** God. Tailed Blue.

Very common throughout the summer.

74 (444) **Hemiargus isola** Reak. Reakirt's Blue.

I have taken specimens at Fort Snelling, September 18, 1910, July 14, 1912, and August 2, 5, 11, 1913.

Family Hesperidae.

75 (469) **Pamphila palaemon** Pall. Arctic Skipper.

Two specimens in the Academy's collection taken at Minneapolis, July 5, 1896, by Mr. H. W. Eustis. One specimen taken at Frazee, in the summer of 1913, by C. Webster.

76 (472) **Ancyloxypha numitor** Fab. Least Skipper.

Rather common, in swampy places in June, July and August. It was unusually common in this vicinity in June and July, 1913. From Pearl Lake, Minneapolis, June 29, and from Fort Snelling, August 2, 1913. In University collection from Gray Cloud Island, Washington County, July 24.

77 (483) **Atrytone zabulon** Bd.-Lec. Zabulon Skipper.

Common, in low swampy places in May and June. From Fort Snelling, May 15, May 22.

78 (484) **Atrytone hobomok** Harr. Mormon.

I have two specimens from Fort Snelling, June 9, June 16, 1912.

79 (484a) **Atrytone hobomok** var. **pocahontas** Scud.

One specimen from Minneapolis, June 16, 1912.

80 (488) **Erynnis sassacus** Harr. Indian Skipper.

One female from Fort Snelling, June 16, 1912.

81 (496) **Erynnis metea** Scud. Cobweb Skipper.

The Academy's collection contains three specimens from Minneapolis, 1894.

82 (519) **Thymelicus otho** Sm.-Abb. Otho Skipper.

One male from Minneapolis, July 14, 1912.

83 (523) **Thymelicus cernes** Bd.-Lec. Tawny-edged Skipper.

Two specimens from Minneapolis, July 14, 1912.

84 (526) **Polites peckius** Krby. Yellow-spot.

Common, in swampy meadows, in June and July. June 25, July 4.

85 (529a) **Euphyes vestris** var. **metacomet** Harr.

I have one female, Fort Snelling, July 21, 1912, and one male from Badger, Roseau County, July 6, 1913. There are specimens in the University collection from Cass County, July 7.

86 (559) **Limochroes dion** Edw.

There are two specimens in the Academy's collection from the state, July 8, 1896.

87 (564) **Phycanassa viator** Edw. Broad-winged Skipper.

One specimen in the Academy's collection from Minneapolis, July 12, 1895.

88 (566) **Phycanassa vitellius** Fab. Vitellius Skipper.

One male and one female, Fort Snelling, July 21, 1912.

89 (584) **Epargyreus tityrus** Fab. Silver-spotted Skipper.

This, the largest of our skippers, is also the commonest. Throughout the summer.

90 (601) **Thorybes pylades** Scud. Northern Cloudy-wing.

One specimen from Badger, June 14, 1913.

91 (618) **Thanaos icelus** Lint. Dreamy Dusky-wing.

Two specimens in the Academy's collection from the state.

92 (624) **Thanaos lucilius** Lint. Lucilius Dusky-wing.

One specimen from Fort Snelling, August 1, 1913.

93 (625) **Thanaos juvenalis** Fabr. Juvenal's Dusky-wing.

Wayzata, May 17, 1914.

94 (642) **Hesperia tessellata** Scud. Tessellated Skipper.

In some years very common, in open fields, in late summer and fall. From Minneapolis, August 1, October 14.

International Commission on Zoological Nomenclature.

Under date of July 20, 1914, Dr. C. W. Stiles, Secretary of the Commission, announced that a majority of the Commission had voted to accept the resignation of Geheimrath Schulze, of Berlin, from that body, and to elect Professor Anton Handlirsch, of Vienna, in his stead.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., OCTOBER, 1914.

Aids to Scientific Work.

In our editorial in the NEWS for May last, we urged the desirability, if not the necessity, of a world-wide bibliographical dictionary of entomologists. Those who appreciate the importance of such material aids to investigation will find much that is suggestive and helpful, in considering possible advances in our science, in Professor Wilhelm Ostwald's "Memorial on the Foundation of an International Chemical Institute," translated into English and published in *Science* for July 31, 1914. Many "possible and necessary undertakings of general value" for which the International Chemical Institute is projected are similar to the needs of entomology. For some of them the International Entomological Congresses are already striving to provide. The development of chemistry and of chemical literature has proceeded to a much greater degree than in our own field, so that the quantitative problems are much heavier there than with us. The organization and methods by which the chemists hope to digest and make useful their vast mass of data, ought to aid us in devising means to attain our ends. Prof. Ostwald has sketched out, in much detail, plans not for the conquest of "the highest spheres of creative scientific work," but for the accomplishment of

> those tasks in the realm of chemical science which are ever recurring in the same form [and which] are to be carried out there once for all and placed at the service of every one; especially the literary reference work and everything connected with it; that is the most trivial and routine labors which are necessary for the advancement of the science. Consequently in the future it should be a fundamental principle in our science that no task of this kind once carried out need ever be repeated, for the finished work should be kept continually and regularly at the disposal of those whom it concerns.

A New Melissodes (Hymen.).

Melissodes asteris n. sp. ♀.—Of the size and form of *M. simillima;* black, except the scopa and some hairs on the face, cheeks, collar, pleura, metathorax, legs and base of abdomen, which are ochraceous.

Carlinville, Illinois. Six female specimens, taken September 12-29, on flowers of *Aster ericoides villosus* and *Boltonia asteroides.*

In my table of local *Melissodes,* Trans. Am. Ent. Soc. 31: 368, 1905, this was included in *simillima* in the clause beginning "sometimes entirely black," but I think it should be separated.—CHARLES ROBERTSON, Carlinville, Illinois.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published, and are all dated the current year unless otherwise noted, always excepting those appearing in the January and February issues of the News, which are generally dated the year previous.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington.

1—Proceedings, Academy of Natural Sciences of Philadelphia. **4**—The Canadian Entomologist. **10**—Nature, London. **11**—Annals and Magazine of Natural History, London. **12**—Comptes Rendus, L'Academie des Sciences, Paris. **21**—The Entomologist's Record, London. **22**—Zoologischer Anzeiger, Leipzig. **25**—Bolletino, Musei di Zoologia ed Anatomia Comparata d. R. Universita di Torino. **31**—Abhandlungen, Senckenbergischen Naturforschenden Gesellschaft, Frankfurt am Main. **36**—Transactions of the Entomological Society of London. **44**—Verhandlungen, K. k. zoologisch-botanischen Gesellschaft in Wien. **51**—Novitates Zoologicae, Tring, England. **68**—Science, New York. **72**—Transactions, Kansas Academy of Science, Topeka. **75**—Annual Report, Entomological Society of Ontario, Toronto. **76**—Journal of the Cincinnati Society of Natural History. **77**—The National Geographical Magazine, Washington, D. C. **79**—La Nature, Paris. **84**—Entomologische Rundschau. **89**—Zoologische Jahrbucher, Jena. **97**—

Zeitschrift fur wissenschaftliche Zoologie, Leipzig. **102**—Proceedings of the Entomological Society of Washington. **119**—Archiv fur Naturgeschichte, Berlin. **123**—Bulletin, Wisconsin Natural History Society, Milwaukee. **143**—Ohio Naturalist. **153**—Bulletin, American Museum of Natural History, New York. **161**—Proceedings, Biological Society of Washington. **166**—Internationale Entomologische Zeitschrift, Guben. **174**—Bulletin of the U. S. National Museum, Washington. **178**—Acta Societatis pro Fauna et Flora Fennica, Helsingfors. **179**—Journal of Economic Entomology. **184**—Journal of Experimental Zoology, Philadelphia. **190**—Deutsche Entomologische Zeitschrift "Iris," Dresden. **191**—Natur. Halbmonatschrift fur alle Naturfreunde. **194**—Genera Insectorum. Diriges par P. Wytsman, Bruxelles. **198**—Biological Bulletin, Marine Biological Laboratory, Woods Hole. **216**—Entomologische Zeitschrift, Frankfurt a. Main. **272**—Memorias, Real Academia de Ciencias y Artes de Barcelona. **275**—Philippine Journal of Science, Manila. **278**—Annales, Societe Zoologique Suisse et du Museum d'Histoire de Geneve, Revue Suisse de Zoologie. **279**—Jenaische Zeitschrift fur Naturwissenschaft. **298**—Ofversigt, Finska Vetenskaps-Societetens Fordhandlingar, Helsingfors. **324**—Journal of Animal Behavior, Cambridge. **334**—Proceedings of the American Academy of Arts and Sciences, New York. **368**—The Monthly Bulletin of the State Commission of Horticulture, Sacramento, California. **369**—Entomologische Mitteilungen, Berlin-Dahlem. **394**—Parasitology, Cambridge, England. **401**—Catalogue of the Lepidoptera Phalaenae in the British Museum, London. **407**—Journal of Genetics, Cambridge, England. **411**—Bulletin of the Brooklyn Entomological Society. **438**—Bulletin of the Illinois State Laboratory of Natural History, Urbana. **443**—Unsere Welt. Bonn. **447**—Journal of Agricultural Research, Washington. **456**—Kosmos, Handweiser fur Naturfreunde, Stuttgart. **463**—Bulletin of the U. S. Department of Agriculture, Washington, D. C. **477**—The American Journal of Tropical Diseases and Preventive Medicine, New Orleans. **478**—University Studies of the University of Nebraska, Lincoln. **479**—Washington University Studies, St. Louis. **480**—The Annals of Applied Biology. **481**—Transactions of the Hertfordshire Natural History Society and Field Club, London. **482**—"Bios" Rivista di Biologia Sperimentale e Generale, Genova.

GENERAL SUBJECT. Fritzsche, R. A.—Das mendeln theoretisch betrachtet fur raupen und falter-zucht, **216,** xxviii, 56-60 (cont.). **Hauri, J.**—Das problem der mimikry, **443,** vi, 442-47. **Hewitt, C. G.**—The Canadian entomological service, **4,** xlvi, 214-16. **Howard, L. O.**—The education of the entomologist in the

service of the U. S. Department of Agriculture, **179,** vii, 274-80. **Lonnberg, E.**—What is binary nomenclature? **11,** xiv, 134-8. **Reuter, O. M.**—Obituary by O. Heidemann, **102,** xvi, 76-8. **Rothschild, L. W.**—Mimicry and protective resemblance, **481,** xv, 105-120. **Urff, G. S.**—Pflanzengallen, **456,** 1914, 292-5.

ARACHNIDA, ETC. Main, H.—The building of a millepede's nest, **481,** xv, 121-3.

Roewer, C. F.—Die familien der Ichyropsalidae und Nemastomatidae der Opiliones-Palpatores, **119,** A. A., H. 3, 99-169.

APTERA AND NEUROPTERA. Anon—Termites and their habits (Review), **10,** xciii, 466. **Bacot & Ridewood**—Observations on the larvae of fleas, **394,** vii, 157-75. **Cummings, B. F.**—Note on the characters of the head and mouth-parts in the genera Plectrotarsus and Aethaloptera, **11,** xiv, 22-23. **Rudow, D.**—Schmarotzer bei N. u. Orthopteren, **216,** xxviii, 71-2.

Davis, W. T.—The dragon fly Anax longipes on Long Island, N. Y., **44,** ix, 34-7. **Jordan & Rothschild**—On the position of Notiopsylla, a new gen. of Siphonaptera. Katalog der Siphonapteren des Koniglichen Zool. Mus. in Berlin, **51,** xxi, 219-23, 255-60. **Longin Navas, R. P.**—Dilaridae, **194,** fasc. 156, 14 pp. Mantispidos nuevos. Neuropteros nuevos o poco conocidos, **272,** xl, 83-103, 105-19. **Martin, R.**—Odonata, Libellulidae, Cordulinae, **194,** fasc. 155, 32 pp. **Meunier, F.**—(See under Orthoptera). **Petersen, E.**—Megaloptera. Raphididae, **194,** Fasc. 154, 13 pp. **Rothschild, N. C.**—New Siphonaptera from Peru, **51,** xxi, 239-51. **Walker, E. M.**—The known nymphs of the Canadian species of Lestes, **4,** xlvi, 189-200.

ORTHOPTERA. Barber, M. A.—Cockroaches and ants as carriers of the vibrios of asiatic cholera, **275,** B, ix, 1-4. **Bretschneider, F.**—(See Coleoptera.) **Butler, H.**—An unusual occurrence of walking-sticks, **179,** vii, 299. **Caudell, A. N.**—The egg of Pseudosermyle truncata, **102,** xvi, 96. **Puschnig, R.**—Bemerkungen zur arbeit H. Karny's "Ueber die reduktion der flugorgane bei den O., **89,** xxxiv, Zool. Phys., 515-42. **Rudow, D.**—(See under Neuroptera.)

Burr, M.—Notes on the Forficularia: Progress in Dermaptera in 1912 and 1913. Notes on the Forficularia, XXII. Notes on the wing venation in the Dermaptera, **11,** xii, 577-86; xiv, 78-84. **Meunier, F.**—Un Blatido y una larva de Odonato del kimeredgense de la Sierra del Monlsech. (Lerida), **272,** xi, 121-6. **Rehn & Hebard**—On the O. found on the Florida Keys and in extreme southern Florida II, **1,** 1914, 373-412.

HEMIPTERA. Hoy, W. E.—A preliminary account of the chromosomes in the embryos of Anasa tristis and Diabrotica vittata, **198**, xxvii, 45-51.

Crawford, D. L.—A monograph of the jumping plant-lice or Psyllidae of the new world, **174**, No. 85, 186 pp. Distant, W. L.—Cicadidae, Gaeaninae, **194**, fasc. 158, 38 pp. Ball, E. D.—Two new California Thamnotettix, **4**, xlvi, 211-13. Hood, J. D.—Studies in tubuliferous Thysanoptera, **161**, xxvii, 151-72. McAtee, W. L.—Key to the nearctic genera and species of Geocorinae, **161**, xxvii, 125-36. Reuter, O. M.—Amerikanische Miriden, **298**, lv, No. 18, 64 pp.

LEPIDOPTERA. Abbott, J. F.—Mimicry in the genus Limenitis with especial reference to the "Poulton hypothesis," **479**, i, 203, 21. Bryk, F.—Ein Citronenblatt mit einer ursprunglichen Weisslingzeichnung, **22**, xliv, 451-58. Cavazza, F.—Influenza di agenti chimici sullo sviluppo, metamorfosi e riproduzione del Bombix mori, **482**, i, 315-89. Courvoisier, Dr.—Nomenklatorische sunden und probleme, **166**, viii, 51-3 (cont.). Doncaster, L.—On the relations between chromosomes, sex-limited transmission and sex-determination in Abraxas grossulariata, **407**, iv, 1-21. d'Herculais, J. K.—Correlation entre la mortalité des Ailanthes (Ailanthus glandulosa) et la disparition du Bombycidae (Samia cynthia) son hote, **12**, 1914, 210-12. Howard, L. O.—Successful introduction of beetles and parasites to check ravages of the gipsy-moth and brown-tail moth, **77**, xxvi, 38-73. Polimanti, O.—Notes on the thele-perception of sex in silk worm moths, **324**, iv, 289-92. Welch, Paul S.—Habits of the larva of Bellura melanopyga, **198**, xxvii, 97-114. Wolff, P.—Ueber die standfuss-fischerschen schmetterlings experimente und ihre bedeutung fur die vererbungsfrage, **191**, v, 397-400 (cont.).

Bethune-Baker, G. T.—Synonymic notes on the Ruralidae, **21**, 1914, 133-36 (cont.). Braun, A. F.—Notes on Coleophora, with descriptions of n. sp., **76**, xxi, 157-67. Busck, A.—On the classification of the Microlepidoptera, **102**, xvi, 46-54. Chapman, T. A.—Lepidopterology, **21**, 1914, 96-8. Comstock, W. P.—Thecla sylvinus and allied species, **411**, ix, 32-4. Courvoisier, L. G.—Zur synonymie des genus Lycaena, **190**, 1914, 143-76. Dukinfield-Jones, E.—New sps. of L.—Heterocera from S. E. Brazil, **36**, 1914, 1-12. Hampson, G. F.—Descriptions of new genera and species of Drepanidae and Thyrididae, **11**, xiv, 103-17. Catalogue of the Noctuidae in the collection of the British Museum, **401**, xiii, 609 pp. Kaye, W. J.—New species of Syntomidae from Venezuela, **21**, 1914, 115-116. Pearsall, R. F.—Short studies in Geometridae No. 3, **411**, ix, 44-5.

DIPTERA. Anon—La lutte contre les mouches et les moustiques, **79,** 1914, 30-2. **Britton, W. E.**—A remarkable outbreak of Culex pipiens, **179,** vii, 257-60. **Cameron, A. E.**—A contribution to a knowledge of the belladona leaf-miner, (Pegomyia hyoscyami) its life history and biology, **480,** l, 43-76. **Echeverria, E.**—Innocuous bites of malaria and yellow fever mosquitoes during the daytime, **477,** i, 625-6. **Felt, E. P.**—Adaptation in the gall midges, **75,** 1913, 76-82. **Frey, R.**—Ueber die mundteile der Mycetophiliden, Sciariden, und Cecidomyiiden, **178,** xxxvii, No. 2, 54 pp. **Grunberg, K.**—Ein verderbliche invasion von Simulium-mucken in der leineniederung. Der wantertrieb der stubenfliegenlarven als hilfsmittel zu ihrer vertilgung, **84,** xxxi, 63-4. **Headlee, T. J.**—Anti-mosquito work in New Jersey, **179,** vii, 260-68. **Hewitt, C. G.**—Further observations on the breeding habits and control of the housefly, Musca domestica, **179,** vii, 281-93. **Hunter, S. J.**—The sand fly and pellagra, III, **179,** vii, 293-4. **Hyde, R. R.**—Fertility and sterility in Drosophila ampelophila, **184,** xvii, 141-71. **Macgregor, M. E.**—The posterior stigma of dipterous larvae as a diagnostic character, **394,** vii, 176-88. **Metz, C. W.**—Chromosome studies in the D., **184,** xvii, 45-60. **Morgan, T. H.**—Two sex-linked lethal factors in Drosophila and their influence on the sex-ratio, **184,** xvii, 81-122. **Morrill, A. W.**—Experiments with house-fly baits and poisons, **179,** vii, 268-74. **Mote, D. C.**—The cheese skipper (Piophila casei), **143,** xiv, 309-16. **Muller, H. J.**—A factor for the 4th chromosome of Drosophila, **68,** xxxix, 906. **Wesenberg-Lund, C.**—Bidrag til nogle myggeslaegters, saerlig Mochlonyx og Corethra's biologie. (Mindeskrift for Japetus Steenstrups, Kobenhaven), xxxiv, 25 pp.

Hendel, F.—Muscaridae, Platystominae, **194,** fasc. 157, 179 pp. **Hine, J. S.**—Diptera of Middle America, **143,** xiv, 333-43. **Knab, F.**—Ceratopogoninae sucking the blood of caterpillars, **102,** xvi, 63-66. Supplementary notes on Peruvian Simuliidae, **161,** xxvii, 123-4. **Krober, O.**—Omphralidae (Scenopinidae), **194,** fasc. 161, 16 pp. **Malloch, J. R.**—Description of a n. sp. of Agromyza from Porto Rico, **102,** xvi, 89-90. Synopsis of the genus Probezzia, with description of a n. sp., **161,** xxvii, 137-40. Notes on No. Am. D., with descriptions of n. sps. in the collection of the Illinois State Laboratory of Natural History, **438,** x, 213-43. **Rondani, C.**—Dipterologia Italica. Vols. I-VIII (1856-1880) [Facsimile edition. W. Junk, No. 16]. **Sack, P.**—Die gattung Merodon ("Lampetia" Meig), **31,** xxxi, 427-62. **Walton, W. R.**—Four n. sps. of Tachinidae from N. Am., **102,** xvi, 90-5.

COLEOPTERA. Boving, A. G.—On the abdominal structure of certain beetle larvae of the Campodeiform type, **102,** xvi, 55-61.

Bretschneider, F.—Ueber die gehirne der kuchenschabe und des mehlkaefers, **279,** lii, 269-362. **Chinaglia, L.**—Anomalia toracle in un C., **25,** xxviii, No. 676, 3 pp. **Coad, B. R.**—Feeding habits of the boll weevil on plants other than cotton, **447,** ii, 235-45. **Harvey, E. N.**—On the chemical nature of the luminous material of the fire fly, **68,** xl, 33-4. **Hoy, W. E.**—(See under Hemiptera). **Kalmbach, E. R.**—Birds in relation to the alfalfa weevil, **463,** No. 107. **Lathrop, F. H.**—Egg-laying of the rice weevil (Calandra oryzae), **143,** xiv, 321-27. **Lehr, R.**—Die sinnesorgane der beiden flugelpaare von Dytiscus marginalis, **97,** cx, 87-150. **Matheson, R.**—Life history notes of two C. (Parnidae), **4,** xlvi, 185-9. **Thaxter, B.**—Laboulbeniales parasites on Chrysomelidae, **334,** l, 17-50.

Achard, J.—Chrysomelidae. Lamprosominae, Chlamydinae & Sphaerocharinae, **194,** fasc. 156-160, 14 & 25 pp. **Champion, G. C.**—Revision of the Mexican and Central American Malachiidae and Melyridae, with descriptions of n. sps., and of Chauliognathinae, based on the genital armature of the males, **36,** 1914, 13-127, 128-68. **Dury, C.**—A new Rhipidandrus from Florida, **76,** xxi, 168. **Heinrich, C.**—Notes on some forest C., with descriptions of two n. sps., **102,** xvi, 66-9. **Knaus, W.**—Additions to the list of Kansas C. for 1910-12, **72,** xxvi, 89-93. **Morris, F. J. A.**—Chrysomelians of Ontario, **75,** 1913, 83-94. **Mutchler, A. J.**—A new sps. of Criocephalus, **153,** xxxiii, 345-46. **Nicolay, A. S.**—The Mordellidae of New York state, **411,** ix, 29-32. **Ohaus, F.**—Phileurus buchwaldi n. sp., **84,** xxxi, 48. **Spaeth, F.**—Neue Cassididen aus Paraguay und Goyaz, **369,** iii, 166-8. **Strohmeyer, H.**—Chapuisiidae, Platypodidae, **194,** fasc. 162-163, 6, 55 pp.

HYMENOPTERA. **Barber, M. A.**—(See under Orthoptera). **Chapman, T. A.**—The egg-laying of Trichiosoma, **36,** 1914, 173-84. **Heyl, D.**—Aus der wunderwelt des bienenlebens, **191,** v, 421-5. **Kelly, E. O. G.**—Notes on the biology of Diplazon laetatorius, **179,** vii, 294-7. **McIndoo, N. E.**—The olfactory sense of H., **1,** 1914, 294-341. **Merle, R.**—L'odynere des murs, **79,** 1914, 52-5.

Cockerell, T. D. A.—Descriptions and records of bees.—LX, LXI, LXII, **11,** xiv, 1-13, 39-57. **Crawford, J. C.**—The species of Perilampidae of America north of Mexico. New parasitic H. from British Guiana, **102,** xvi, 69-76; 85-88. **Cushman, R. A.**—A new sp. of the braconid genus Phanerotoma, **102,** xvi, 78-9. **Forel, A.**—Le genre Camponotus et les genres voisins, **278,** xxii, 257-76. **Girault, A. A.**—The chalcidoid family Trichogrammatidae, **123,** xi, 150-179 (cont.). **Howard, L. O.**—Concerning some Aphelininae, **102,** xvi, 79-85. **McGillivray, A. D.**—The immature stages of the Tenthredinoidea, **75,** 1913, 54-75. **Morley, C.**—A revision of the

Ichneumonidae Part III, Tribes Pimplides and Bassides, 148 pp., 1914. (British Museum Publication). **Smith & Vosler**—Calliephialtes in California, **368,** iii, 195-211. **Strand, E.**—Ueber das nest einer neotropischen wespe, Polybia occidentalis, **369,** iii, 171-3. **Swenk, M. H.**—Studies of N. Am. bees, **478,** xiv, 1-36.

Études de Lépidoptérologie Comparée. By Charles Oberthür, Vol. 9, part 2, Rennes, France, May, 1914.—Mr. Oberthür has again made a splendid contribution to the study of the American butterflies which will clear up a number of species not properly understood here. He was awarded the Cuvier prize of the French Academy of Sciences, for his Études d'Entomologie and Études de Lépidopteres Comparée, a well deserved honor. The first thirty-three pages of part two are taken up by a review of the South American species of *Apatura,* illustrated by nine plates and many colored figures. The Lepidoptera of the Thibetan region are also mentioned and certain species are figured. Nearly all of these are species described by Mr. Oberthür. A new species of *Castnia* from Uruguay is described and figured. Then follows what concerns us most, the continuation of the beautiful figures of the Californian butterflies described by Doctor Boisduval. This section comprises fourteen pages of notes on the species, seven plates and forty-one colored figures. These will necessitate a number of changes in the synonymy and also the standing of the species in our American catalogues. The difficulty now is to understand the exact status of the species described by Doctor Behr. Unfortunately his types were destroyed when the earthquake and fire destroyed the building of the San Francisco Academy of Sciences. Fortunately Mr. W. H. Edwards figured a number of Doctor Behr's species, which he doubtless received from that author. We could also accept the specimens mentioned by Strecker as the types. In his Lep. Rhop. Het. Suppl. 3, he says he possesses the types of *Argynnis coronis, rupestris montivaga* and *monticola,* all described by Behr. At the present time these might be considered cotypes or possibly only metatypes.

The principal changes will likely be as follows:

Arg. callipe. This is as understood by American students.

Arg. zerene. This has been misunderstood, and what Mr. Edwards figured as *zerene* is quite another insect. *Purpurascens* Hy. Edws. is quite close, if not the same.

Arg. mormonia. Eurynome and its numerous varieties will probably have to be considered varieties of *mormonia.*

Arg. juba. Liliana Hy. Edws. is a synonym. This is one of the surprises shown by these figures.

Arg. hydaspe. Rhodope Edwards and *sakuntala* Skinner are very close to this.

Mel. orsa is a synonym of *montana* Behr.

Mel. epula is a synonym of *mylitta* Edw.

Mel. sonorae is a synonym of *gabbii* Behr.

Mel. pola is a synonym of *minuta* Edw.

Mel. callina is close to *persc* Edw. and the latter name may have to fall.

A number of aberrations are figured and named and a new species described, *Syrichtus mac-dunnoughi*. Mr. Oberthür must be credited with the name *Satyrus ariane-okius* as Doctor Boisduval apparently did not publish any name with this form, although he described it.

The California butterflies have been in a chaotic condition for years, and we are now getting light on the subject. The genus *Lycaena* was particularly hopeless, as a number of authors were describing differences that they did not understand. An examination of the genitalia will place them on a firmer foundation, but the final placing of the varieties, forms and species will come from a study of their life histories and breeding numerous specimens from known parentage.

A very valuable and interesting feature of this part is the collection of portraits of distinguished lepidopterists.

This series shows likenesses of Boisduval, Herrich-Schaeffer, Rambur, Graslin, Guenée, Millière, Fallou, Bar, Guillemot, Fettig, Martin, Macker, Constant, Moore, Lafaury, Allard, Reverdin and Oberthür.—Henry Skinner.

Doings of Societies.

PACIFIC COAST ENTOMOLOGICAL SOCIETY.

The forty-fifth regular meeting was held on the evening of September 14, 1912, at the residence of Dr. F. E. Blaisdell, 1520 Lake Street, San Francisco, California.

President Van Dyke in the chair. Eleven members responded to roll call. Nine guests were present.

A communication was read from Mr. Fordyce Grinnel, in which he stated that Messrs. Newcomb, Haskin and Coolidge had recently (last of August) taken a nice series of *Lycaena neurona* Skinner on Mt. Wilson.

Mr. Huguenin made a few remarks about collecting in Marin County, California.

Percy Baumberger, who is engaged in the work of extermination of mosquitoes, reported on the manner in which the campaign was being carried on.

Mr. Fuchs distributed to the members of the Society some specimens of *Aegialites fuchsi* Horn taken on the Farallone Islands.

Mr. Cottle gave an account of his summer's vacation in July at Castella, Shasta County, California, stating that specimens of *Monohammus maculosus* Hald. had been taken at an elevation of about 3000 feet.

Mr. Bridwell gave his experiences in collecting in the Imperial Valley. Mr. Reynolds reported the results of his work at San Diego, California.

Dr. Van Dyke discussed the distribution of the species of *Harpalus* and *Aegialites*, with an account of work done on a collecting trip to Strawberry Canyon, Eldorado County, elevation 6000 feet.

Mr. Huguenin exhibited specimens of Coleoptera and Lepidoptera taken in the Yosemite Valley.

Mr. Reynolds presented a series of *Cicindelae* from San Diego, California.

Mr. Cottle showed a collection of Coleoptera and Lepidoptera taken at Castella, California.

Miss Wright exhibited several specimens of Coleoptera and Mr. Bridwell a number of insects from the Imperial Valley, California.

Adjournment and refreshments.

The forty-sixth meeting was held on the evening of December 3, 1912, at the residence of James E. Cottle, 2117 Bush Street, San Francisco, California.

President Van Dyke in the chair. Ten members responded to roll call. Eight guests were present.

Mr. J. C. Huguenin read a paper on the collecting of *Calligrapha sigmoidea* for three consecutive winters—1910, 1911 and 1912—on the Sunnyside Hills, at an elevation of 500 feet, in the suburbs of San Francisco.

A communication from Mr. F. X. Williams, giving an interesting account of the general conditions of the country in

Kansas, and of the Biological Expeditions sent out by the University of Kansas, was then read.

Mr. Grundel reported a prolonged collecting trip to the Sierras.

Mr. Harold C. Bryant gave a very instructive talk on "Protective Devices in Insects." He asked for the opinions of the members present. It was stated that bee-birds (*Tyrannus verticalis* and *T. vociferans*) feed only upon the drone bees. Dr. Blaisdell stated that he was positive that they feed abundantly upon the worker-bees (*Apis mellifica*), for, during fourteen years in which he had worked in an apiary, he had shot hundreds of bee-birds to protect the worker-bees. The stomachs of the birds were repeatedly examined and found filled with bee-stings which appeared to be indigestible.

Mr. Ralph Hopping, who is engaged in the Forestry Service for Insect Control, gave an account of the work done in the service, speaking in particular on the ravages of *Dendroctonus* and *Phloesinus;* the former killing the trees on which they depredate, the latter only the branches.

Mr. Bridwell spoke of two rare or little known species of Hymenoptera which he had collected—*Methoca californica* Westwood, female, from Monte Rio, Sonoma Co., California, parasitic in the burrows of tiger-beetles, and the female of a new species of *Myrmosa* taken on the University of California campus, Berkeley.

Mr. Grundel stated that the larvae of *Arctia* become abundant at times in the Santa Cruz Mountains and defoliate all of the live oaks.

President Van Dyke gave a review of the genera of the *Elateridae.*

Dr. Blaisdell exhibited specimens of *Thysanocnemis helvolus* and *Idiostethus tubulatus* collected by beating in the vicinity of Baltimore, Md.; two specimens of *Synetocephalus autumnalis* Fall, collected at Mokelumne Hill, Calaveras County, California, in October, from the foliage of the live oaks (*Quercus wislizeni*).

Adjournment and refreshments.

The forty-seventh meeting was held on the evening of March 1, 1913, at the residence of Dr. F. E. Blaisdell, 1520 Lake Street, San Francisco, Cal.

President Van Dyke in the chair. Ten members answered to roll call and nine guests were in attendance.

A communication from J. N. Bowman in regard to the Society meeting with the Pacific Association of Scientific Societies was discussed.

The death of Mr. L. E. Ricksecker was announced. Mr. Cottle moved that the secretary be instructed to express the regrets of the Society to Mrs. Ricksecker and family. The motion was seconded and unanimously approved.

Prof. Wm. A. Hilton, editor of the Pomona Journal, Claremont, California, and Miss Ximena McGlashan, of Truckee, California, were elected members of the Society.

The secretary read a paper by Mr. R. F. Sternitzky, the author being absent. It was a "Report on Two Collecting Trips to Lake Tahoe." During the latter part of August Mr. Sternitzky collected seven large larvae of a Syrphid, probably of the genus *Microdon*, from ants' nests. He mistook the *Microdon* larvae for a species of Coccid—a Lecanid. Its markings are radial lines, similar to those of some Coccidae. He stated that he was sure of one thing—that these larvae do not derive nourishment from the ants, as they throve quite well on moist wood. It was thought that the ants might have some use for them. The following is a list of the rarer Coleoptera taken during the trips: *Buprestis connexa*, *Acmaeodera vandykei*, *Ulochactes leoninus*, *Tragosoma pilosicornis*, *Pterostichus morionides*, *Tachys fallii*, *Argonus cinerarius*, *Leptura valida*, *Pachyta spurca*, *Adelocera rorulenta*, *Melasis rufipennis* and *Serropalpus barbatus*. Dr. Van Dyke believed that the Syrphid larvae were dependent on the ants.

Mr. Bridwell stated that he took *Dichelonycha clypeata* in Wild Cat Canyon back of Grizzly Peak, Alameda County, California, on February 13, 1913. Eight specimens were secured. The beetles were flying high up among the laurel trees.

Dr. Van Dyke said that *Dichelonycha clypeata* was described from a unique. Later Mr. Ricksecker collected many. Mr. A. Kusche found four or five in San Mateo County; Mr. Bridwell took males in Contra Costa County. The species was first recorded from the Alameda side of the Bay. *D. valida* is also found in Alameda County, in April, on Redwood Peak.

Adjournment and refreshments.

A special meeting was held in conjunction with the Pacific Association of Scientific Societies, on Thursday evening, April 10, 1913, in Room 113 of the Agricultural Hall of the University of California, Berkeley. Twelve members and guests were present.

The meeting was called to order at eight o'clock by President Van Dyke. After a few appropriate remarks the following program was presented:

New Species of Tenebrionidae and the Technique for Studying the Genitalia of the Coleoptera, by Frank E. Blaisdell, Sr.

A Review of the Coccinellidae, by F. W. Nunenmacher.

The Littoral Coleopterous Fauna of the Pacific Coast, by Edwin C. Van Dyke.

Remarks on the Use of the Lantern in Illustrating the Insects of Economic Importance, by Prof. C. W. Woodworth.

The forty-eighth meeting, or Field Day, was not held as no arrangements or decisions had been made at the forty-seventh meeting.

F. E. Blaisdell, *Secretary.*

OBITUARY.

An obituary notice of Carl Fuchs, well known as a coleopterist, was published by Dr. F. E. Blaisdell in *Science* for July 17, 1914. Mr. Fuchs was born in Hanau, Frankfurt-am-Main, November 25, 1839, and died in Alameda, California, June 11, 1914. His visit to the Eastern United States, a few years ago, is still fresh in the memory of his friends.

EXCHANGES.

Not Exceeding Three Lines Free to Subscribers.

☞ These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued

I offer for exchange a few perfect, bred specimens of *Vanessa gonerilla* in papers. Desire many common North American species of Lepidoptera, both Macro and Micro.—Fred Marloff, Box 104 Oak Station P.O., Allegheny Co., Pa.

Specialists—I will collect for cash any order of insects during the coming season in this vicinity. Flat rates given.—Harry Johnson, South Meriden, Conn.

For Exchange—Volumes VII to XII Entomological News for other entomological publications or for Lepidoptera.—Alex. Kwiat, 2055 Pensacola Ave., Chicago, Ill.

Wanted, for my own library—Papers by LeConte, Horn, Harris, Randall and Melsheimer in Jour. Bost. Soc. Nat. Hist., 1835, 1845; Jour. Acad. Nat. Sci. Phila., 1852; Proc. Acad. Nat. Sci. Phila., 1844, 1856, 1868; Trans. Amer. Ent. Soc., Vols. 3, 4, 5, 7; Lists of Coleoptera, J. D. Putnam, 1876; Schiödte, Metamorphoses, Parts 2, 6; Casey, Contributions to Coleopterology, Part 2, 1884.—Address John D. Sherman, Jr., 403 Seneca Ave., Mount Vernon, N. Y.

To complete sets in my library I need No. 1 of Vol XXX, Canadian Entomologist, Riley's 9th Missouri Report and No. 18 of Henry Edwards' Pacific Coast Lepidoptera. I will give cash or liberal exchange in California insects.—H. H. Newcomb, Venice, California.

Heteroptera—I am engaged on the study of this group and desire material from all regions, especially New England. Will exchange in this and other orders. Correspondence desired.—H. M. Parshley, Bussey Institution, Forest Hills, Mass.

Wanted—to purchase for cash the following numbers of the Experiment Station Record, Vol. I, No. 2; Vol. II, Nos. 2 and 9; Vol. III, Nos. 4 and 10.—J. F. Abbott, Washington University, St. Louis, Mo.

Wanted—Larvae or ova of *cecropia*, *polyphemus* and *Saturnia galbina.*—O. C. Poling, Phoenix, Arizona.

Chrysophanids wanted—I want very specially *Heodes fieldeni*, *Chalceria snowi*, *cupreus*, *rubidus*, *Satyrium fuliginosa.* I should like also some specimens of *Gaeides xanthoides*, *editha* and *gorgon.* Palaearctics, exotics or cash given in exchange.—G. T. Bethune-Baker, 19 Clarendon Road, Edgbaston, England.

Wanted—To make arrangements with dealers and collectors to furnish bred specimens of Lepidoptera for cash. Will send first class material only. New England and other species.—Sidney C. Carpenter, 49 Oakland Terrace, Hartford, Conn.

I have in papers for exchange, the rare high altitude (16,200 feet) Himalayan *Parnassius sikkimensis*, *hardwickei*, and *Papilio machaon sikkimensis* in exchange for American *Parnassius eversmanni* or West Coast Saturnidae.—J. Henry Watson, 70 Ashford Road, Withington, Manchester, England.

Colias interior—Fine specimens, some bred, for sale or exchange for other North American Lepidoptera.—Arthur H. Napier, Spring Lane, Chestnut Hill, Pa.

Photographs of Entomologists Desired.

The Entomological Section of the Philadelphia Academy of Natural Sciences desires for its entomological album the photograph of every entomological student. The collection contains over 300 at this date. A list was published in the NEWS 1902, pages 45-47, of those in the album at that time. We hope that those who can do so will write their names and date of birth and the date when the photograph was taken on the back of each photo, along with any other information concerning themselves they may wish to impart.

NEW JERSEY ENTOMOLOGICAL COMPANY

HERMAN H. BREHME, Manager

Dealers in Insects of all Orders. Lepidoptera, Cocoons and Pupae. Life Histories. Cocoons and Pupae bought. Entomological Supplies, Insect Pins, Cork, Riker Specimen Mounts, Nets, Spreading Boards, Boxes, etc.

74-80 THIRTEENTH AVENUE, NEWARK, NEW JERSEY, U. S. A.

Send 4 cents for Price List of Insects and Supplies.

The Museum of the Brooklyn Institute has a few uncolored sets of the Calverly, Weidemeyer and Edwards plates of North American Sphingidae which it desires to exchange for other entomological publications, or to sell at $5 per set. Address Librarian, Brooklyn Museum, Eastern Parkway, Brooklyn, N. Y.

Title page, preface, history and explanation of the Weidemeyer, Calverley, Edwards plates may be procured for 25 cents from The American Entomological Society, 1900 Race St., Philadelphia, Pa.

SECOND-HAND BOOKS—Entomological and Botanical—for sale at bargain—List on application with 2c. stamp.—Elizabeth F. Curtiss, 4853 Kimbark Ave., Chicago, Ill.

RECENT PUBLICATIONS

FOR SALE BY

THE AMERICAN ENTOMOLOGICAL SOCIETY

1900 RACE STREET, PHILADELPHIA, PA.

687.—**Malloch** (J. R.).—Costa Rican Diptera collected by Philip P. Calvert, Ph.D., 1909-1910. Paper I. A Partial Report on the Borboridae, Phoridae and Agromyzidae. (**40**, 1-36, 1 pl., '14) ..... .35

688.—**Rehn and Hebard.**—A Revision of the Orthopterous Group Insarae (Tettigoniidae, Phaneropterinae). (**40**, 37-184, 71 Text Figs., '14) 1.50

689.—**Chamberlin** (R. W.)—On a Collection of Myriapoda from Costa Rica. (**40**, 185-194, 1 pl., '14) ..... .15

690.—**Skinner** (H.).—Studies in the Genus Thanaos. (**40**, 195-221, 14 text figs., '14) ..... .30

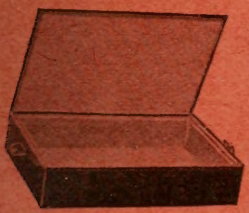
Mailed on receipt of price.

A new issue of price lists of publications is now available and will be sent on request. Please state subject desired when writing for lists.

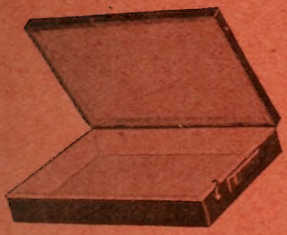
The Celebrated Original Dust and Pest-Proof

METAL CABINETS

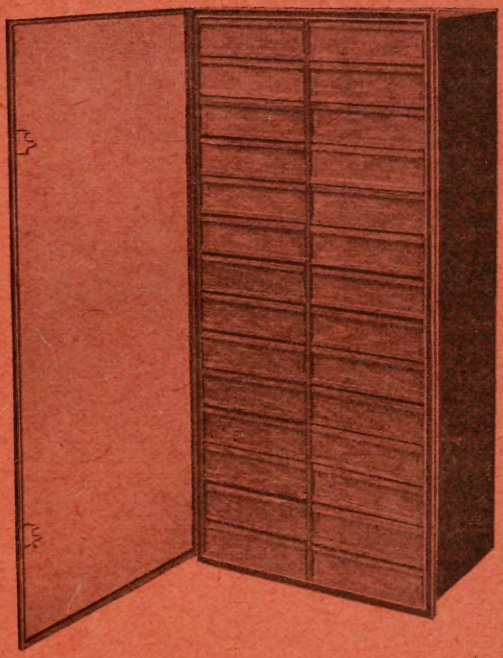
FOR SCHMITT BOXES



METAL INSECT BOX



WOOD INSECT BOX



These cabinets have a specially constructed groove or trough around the front, lined with a material of our own design, which is adjustable to the pressure of the front cover. The cover, when in place, is made fast by spring wire locks or clasps, causing a constant pressure on the lining in the groove. The cabinets, in addition to being absolutely dust, moth and dermestes proof, is impervious to fire, smoke, water and atmospheric changes. Obviously, these cabinets are far superior to any constructed of non-metallic material.

The interior is made of metal, with upright partition in center. On the sides are metal supports to hold 28 boxes. The regular size is 42½ in. high, 13 in. deep, 18¾ in. wide, inside dimensions; usually enameled green outside. For details of Dr. Skinner's construction of this cabinet, see Entomological News, Vol. XV, page 177.

METAL INSECT BOX has all the essential merits of the cabinet, having a groove, clasps, etc. Bottom inside lined with cork; the outside enameled any color desired. The regular dimensions, outside, are 9 x 13 x 2½ in. deep, but can be furnished any size.

WOOD INSECT BOX.—We do not assert that this wooden box has all the qualities of the metal box, especially in regard to safety from smoke, fire, water and dampness, but the chemically prepared material fastened to the under edge of the lid makes a box, we think, superior to any other wood insect box. The bottom is cork lined. Outside varnished. For catalogue and prices inquire of

BROCK BROS., Harvard Square, Cambridge, Mass.

THE KNY-SCHEERER COMPANY

Department of Natural Science 404-410 W. 27th St., New York

North American and Exotic Insects of all orders in perfect condition
Entomological Supplies Catalogue gratis

INSECT BOXES—We have given special attention to the manufacture of insect cases and can guarantee our cases to be of the best quality and workmanship obtainable.

NS/3085

NS/3085—**Plain Boxes for Duplicates**—Pasteboard boxes, compressed turf lined with plain pasteboard covers, cloth hinged, for shipping specimens or keeping duplicates. These boxes are of heavy pasteboard and more carefully made than the ones usually found in the market.

Size 10x15½ in. ..... Each $0.25
Size 8x10½ in. ..... Each .15

NS/3091—**Lepidoptera Box** (improved museum style), of wood, cover and bottom of strong pasteboard, covered with bronze paper, gilt trimming, inside covered with white glazed paper. Best quality. Each box in extra carton.

Size 10x12 in., lined with compressed turf (peat). Per dozen 5.00
Size 10x12 in., lined with compressed cork. Per dozen 6.00

Caution:—Cheap imitations are sold. See our name and address in corner of cover.

NS/3091

(For exhibition purposes)

NS/3121

NS/3121—**K.-S. Exhibition Cases**, wooden boxes, glass cover fitting very tightly, compressed cork or peat lined, covered inside with white glazed paper. Class A. Stained imitation oak, cherry or walnut.

Size 8x11x2⅝ in. (or to order, 8¾x10¾x2¾ in.) $0.70
Size 12x16x2⅝ in. (or to order, 12x15x2¾ in.) 1.20
Size 14x22x2⅝ in. (or to order, 14x22x2⅝ in.) 2.00

Special prices if ordered in larger quantities.

THE KNY-SCHEERER CO.

DEPARTMENT OF NATURAL SCIENCE.

G. LAGAI, Ph.D., 404 W. 27th Street, New York, N. Y.

PARIS EXPOSITION:
Eight Awards and Medals

PAN-AMERICAN EXPOSITION
Gold Medal

ST. LOUIS EXPOSITION: Grand Prize and Gold Medal

ENTOMOLOGICAL SUPPLIES AND SPECIMENS

North American and exotic insects of all orders in perfect condition.
Single specimens and collections illustrating mimicry, protective coloration, dimorphism, collections of representatives of the different orders of insects, etc.
Series of specimens illustrating insect life, color variation, etc.
Metamorphoses of insects.
We manufacture all kinds of insect boxes and cases (Schmitt insect boxes Lepidoptera boxes, etc.), cabinets, nets, insects pins, forceps, etc..
Riker specimen mounts at reduced prices.
Catalogues and special circulars free on application.
Rare insects bought and sold.

FOR SALE—Papilio columbus (gundlachianus), the brightest colored American Papilio, very rare, perfect specimens $1.50 each; second quality $1.00 each.

When Writing Please Mention "Entomological News."

P. C. Stockhausen, Printer, 53-55 N. 7th Street, Philadelphia.